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THE ANNALS  
AND  
MAGAZINE OF NATURAL HISTORY,  
INCLUDING  
ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'ANNALS' COMBINED WITH LOUDON AND  
CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY'.)

CONDUCTED BY  
ALBERT C. L. G. GÜNTHER, M.A., M.D., Ph.D., F.R.S.,  
WILLIAM CARRUTHERS, F.R.S., F.L.S., F.G.S.,  
AND  
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"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque *inſpectio* ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exulta; malè doctis et barbaris semper inimica fuit."—LINNÆUS.

"Quel que soit le principe de la vie animale, il ne faut qu'ouvrir les yeux pour voir qu'elle est le chef-d'œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations."—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

. . . . . The sylvan powers  
Obey our summons; from their deepest dells  
The Dryads come, and throw their garlands wild  
And odorous branches at our feet; the Nymphs  
That press with nimble step the mountain-thyme  
And purple heath-flower come not empty-handed,  
But scatter round ten thousand forms minute  
Of velvet moss or lichen, torn from rock  
Or rifted oak or cavern deep: the Naiads too  
Quit their loved native stream, from whose smooth face  
They crop the lily, and each sedge and rush  
That drinks the rippling tide: the frozen poles,  
Where peril waits the bold adventurer's tread,  
The burning sands of Borneo and Cayenne,  
All, all to us unlock their secret stores  
And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.



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## CATALOGUE

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By PROF. C. STEWART, LL.D., F.R.S., &c.

TAYLOR and FRANCIS, Red Lion Court, Fleet Street, E.C.

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

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"..... per litora spargite muscum,  
Naiades, et circum vitreos considite fontes:  
Pollice virgineo teneros hic carpite flores:  
Floribus et pictum, divæ, replete canistrum.  
At vos, o Nymphæ Craterides, ite sub undas;  
Ite, recurvato variata corallia trunco  
Vellite muscosis e rupibus, et mihi conchas  
Ferte, Deæ pelagi, et pingui conchylia succo.  
*N. Parthenii Giannettusi*, Eol.

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No. 43. JULY 1901.

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### I.—*Notes on the Recent Literature of Japanese Land-Snails.*

By Dr. HENRY A. PILSBRY, Special Curator of the Department of Mollusca, Academy of Natural Sciences of Philadelphia.

AFTER a period of twenty years, during which but little was published upon the land-mollusks of Japan, their investigation has been resumed by several students with the greatest vigour. This revival has been due primarily to the work of collecting undertaken by Mr. Y. Hirase, of Kyoto, Japan. With assistants trained in the best methods of collecting all parts of the Island Empire are being searched for mollusks. The direction of this work involves not only an intelligent appreciation of the zoological problems awaiting solution and of the value of such work in advancing the intellectual development of Japan, but large pecuniary outlay as well. And disinterested devotion to zoological exploration, though happily no longer rare in England and America, is not yet common enough to be passed without a word of appreciation.

It is my purpose in this article to discuss briefly certain  
*Ann. & Mag. N. Hist. Ser. 7. Vol. viii.*

questions of distribution and classification, to give a list of the species described since the beginning of the year 1900, and to record the somewhat extensive synonymy created during that period.

The work has already reached a point where conclusions of general interest are appearing. The Palæarctic element in the Japanese mollusk-fauna is inconsiderable, but the Oriental element has obviously reached the islands by two routes—a northern, *viâ* Sachalin Island, bringing in mainland forms of the Amur valley and northward, and a southern, *viâ* the Loochoo chain and Formosa, and probably from Corea also, though until that peninsula is better known we cannot state this with confidence. Thus, to give one instance, the Japanese group of species commonly referred to the Helicid subgenus *Acusta* is in reality of dual origin: the species of Hondo and Kiushiu (*E. Sieboldiana*, Pfr., *E. plicosa*, Martens\*) are related through *Eulota despecta* of the Loochoo group to *E. assimilis*, H. Ad., of Formosa, and to species of Central China. *Eulota læta*, Gld., of Hokkaido (Yesso) Island, on the other hand, is allied to species of Northern China and the Amur valley, and really belongs to the subgenus *Mastig-eulota*. A similarly dual origin can be traced in various other genera.

The great number of localities explored by Mr. Hirase's collectors permits us now to plot the ranges of many species before known from one locality or from but few places. As the work goes on this will enable us to formulate the lines of migration and the faunal zones or areas of specific and sub-specific differentiation. It is already clear that the islands composing Japan are strikingly unlike most island groups in this—that the several islands, *as such*, are younger than the species of snails living upon them, whereas in most island groups areas of specific and varietal differentiation coincide with the geographic limits of the several islands. In other words, the existing species of Japanese snails were in great part differentiated and acquired their present distribution before the islands were separated†. Present knowledge indicates that continuous land extended from the middle Loochoo group to Hokkaido. The Loochoos were first isolated by subsidence; then Hokkaido was cut off. Hondo,

\* *H. plicosa* seems to be merely a synonym of *despecta*, Gray, which occurs in the southern provinces of Kiushiu, as well as in the Loochoo islands.

† The evidence, so far as supplied by Helices of the *Euhadra* and *Ganesella* groups is concerned, has been elaborated in a still unpublished paper by Mr. Addison Gulick and myself.

Shikoku, and Kiushiu remained connected until very recent time, and have been separated within the life of those slightly differentiated races which we term "subspecies." From southern Kii, through Awaji and Shikoku Islands, across Bungo Channel to Kiushiu, and westward across the lower end of the Inland Sea to the west end of Hondo, must have been a continuous land-area since Pliocene and down to geologically recent time. Not only numerous species, but mere races of more widely spread species, occupy this area, and such a distribution is quite inexplicable except upon the theory that the areas in question, though now separated, were until recently a unit geographically, as they still are faunally. There are doubtless species existing on Shikoku Island which do not extend beyond its limits; but the local differentiation is not greater than upon an equal area of Hondo and does not make against the view just set forth.

In respect to classification and generic nomenclature, the Japanese Zonitidæ are in great confusion. Reinhardt, many years ago, referred the species known to him to European groups of the family. Early last year I recognized the fact that the Japanese Zonitidæ belong mainly to Oriental, not European genera. This opinion found expression in articles published in August (vi. p. 382) and November (xv. p. 81), in which I referred various species to the Oriental genera *Macrochlamys* and *Kaliella*, showed that the name *Euconulus*, Reinh., must replace the names *Conulus* and *Arnouldia*, and expressed my belief that the Japanese species referred to these groups really belong to *Kaliella*. Dr. v. Möllendorff, in an article just published (xxi. pp. 35, 37), has reached conclusions in part anticipated by my papers, in part at variance with them. He has referred numerous species to the genus *Microcystina* of Mörch, most of them, I think, incorrectly. The establishment of *Microcystina* upon an adequate basis we owe to Godwin-Austen, who showed that it is characterized by a callous thickening or flexure of the columella. Of the Japanese species known to me by specimens, only *Arnouldia ceratodes*, Gude, has this feature. I consider v. Möllendorff's reference of this species to *Microcystina* justified. The species *Dœnitzi*, *sinapidium*, and *Hirasei* of his *Microcystina* list have the shell-characters of *Macrochlamys*, and not of *Microcystina*. Most of the other species he mentions are known to me, as they are to him, by the descriptions only, and their generic reference is little better than guesswork.

*Gastrodontella*, Möllendorff, a new genus proposed for *G. japonica*, Mlldff. (1901), a synonym of *Kaliella multi-*



*volvis*, Pils. (1900), is thought by Dr. v. Möllendorff to have affinities with *Gastrodonta* or *Sesara*. The internal teeth in *K. japonica* are short transverse barriers at intervals of one third of a whorl, precisely similar to those found in *Euconulus fulvus* (Drap.), var. *dentatus* (Sterki), with which *K. multivolvis* has many features in common. A similar barrier exists in *Kaliella ruga*, Godwin-Austen, and some other Indian species. In *K. multivolvis* the barriers are very inconstant, completely lacking in some examples, varying in others from one to three in number. The same inconstancy attends the development of internal teeth, barriers, or laminæ in *Gastrodonta*, *Sagda*, &c., in which *the same species may have them strongly developed or totally absent*, as is well recognized by all American students who have investigated the matter. In my opinion, therefore, *Gastrodontella* has no valid claim to generic rank. It belongs to *Kaliella*.

It is not my purpose to discuss the classification of Japanese Helicidæ at any length in this place; but a single group calls for remark. In my 'Guide to the Study of Helices' I proposed, under the name *Mandarina*, a new section of the genus *Eulota* for the reception of *Helix mandarina*, Gray, of the Bonin Islands (Ogasawara-sima). It is now my opinion that this group has nothing to do with *Eulota*, but probably belongs to the Camæninæ. The nepionic shell is relatively large and acutely carinate (as in *Camæna*), is sculptured with fine radial wrinkles at first, with spiral striæ on the outer whorl, and usually continuing upon the postnepionic whorls. The adult shell is extremely heavy for a land-snail, and has a blunt expanded lip. The group is probably of generic rank, and will for the present include three species—*Helix mandarina*, Gray, *H. Pallasiana*, Pfr. (hitherto referred to *Oxytes*), and *Nanina Ruschenbergeri*, Pilsbry. The latter two are depressed and openly umbilicate, and will form a separate section of the genus *Boninia*. All of them are probably confined to the Bonin Islands, although they have been attributed to various localities. The Bonin Islands have incontestably a fauna of "continental" type.

The new species described from Japan, the Loochoo and Bonin Islands, in the twenty-two papers published since Jan. 1, 1900, are as follows. I have appended to each, where necessary, notes on the synonymy &c. The list is arranged chronologically, and the papers are referred to by their numbers in the bibliography following.

*Diplommatina tenuiplica*, Pilsbry (i. p. 525).

*Ennea iwakawa*, Pilsbry (i. p. 525, pl. xxi. fig. 10).

- Eulota (Acusta) Gainesi*, Pilsbry (I. p. 526).—Belongs to the section *Mastigeulata*.
- *luna*, Pilsbry (I. p. 526, pl. xxi. figs. 1–3).
- (*Ægista*) *aperta*, Pilsbry (I. p. 527, pl. xxi. figs. 7–9).
- (*Cœlorus*) *cavicolis*, Pilsbry (I. p. 527, pl. xxi. figs. 11–13).
- *rudis*, Pilsbry (I. p. 528, pl. xxi. figs. 20–22).—A synonym of *Trishoplita Hilgendorfi*, Kob.
- Ganesella satsuma*, Pilsbry (I. p. 528, pl. xxi. figs. 20–22).—A subspecies of *G. japonica*, Pfr.
- *ferruginea*, Pilsbry (I. p. 529, pl. xxi. figs. 14–16).
- *heteroglypta*, Pilsbry (I. p. 529, pl. xxi. figs. 17–19).—Probably a subspecies of *G. japonica*, Pfr.
- Eulota (Plectotropis) Hirasei*, Gude (II. p. 10, pl. ii. figs. 4–7).—A synonym of *E. cavicolis*, Pils.
- (*Ægista*) *awajiensis*, Gude (II. p. 11, pl. ii. figs. 8–10).—A synonym of *E. aperta*, Pils.
- *horrida*, Pilsbry (III. p. 11).
- (*Trishoplita*?) *mesogonia*, Pilsbry (III. p. 11).—Doubtless a *Trishoplita*.
- Ganesella Jacobii*, Pilsbry (III. p. 12).
- Cyclotus* (?) *micon*, Pilsbry (III. p. 12).
- Pomatiopsis Hirasei*, Pilsbry (III. p. 12).—This is *Blanfordia Bensoni*, A. Ad. The genus belongs to the Pomatiopsinæ.
- Buliminus Hirasei*, Pilsbry (IV. p. 32).
- *extorris*, var. *omiensis*, Pilsbry (IV. p. 32).—An elongate variety of *B. reinianus*, Kob.
- *callistoderma*, Pilsbry (IV. p. 33).
- Plectotropis polyplecta*, Ehrmann (V. p. 379).—A synonym for *Eulota horrida*, Pils.
- *delectabilis*, Ehrmann (V. p. 380).
- *pachysoma*, Ehrmann (V. p. 380).—Seems to be identical with *Eulota secpasma*, Pfr.
- Trishoplita pallens*, Ehrmann (V. p. 381).
- Ganesella pagodula*, Ehrmann (V. p. 381).
- Clausilia (Phædusa) crassilamellata*, Ehrmann (V. p. 382).
- (—) *ijimæ*, Ehrmann (V. p. 382).
- (—) *cincticollis*, Ehrmann (V. p. 383).
- Alyceus harimensis*, Pilsbry (VI. p. 381).
- *Reinhardtii*, Pilsbry (VI. p. 381).
- (*Metalyceus*) *melanopoma*, Pilsbry (VI. p. 382).
- (—) *Hirasei*, Pilsbry (VI. p. 382).
- Diplommata pusilla*, var. *omiensis*, Pilsbry (VI. p. 382).
- Macrochlamys micrograpta*, Pilsbry (VI. p. 382).—The locality, Kashima, prov. Harima, was inadvertently omitted.
- Kaliella multivolvis*, Pilsbry (VI. p. 383).
- Vitrea harimensis*, Pilsbry (VI. p. 384).—Seems to be the young of *Macrochlamys Dœnitzi*, Reinh.
- Georissa japonica*, Pilsbry (VI. p. 384).
- Chloritis (Trichochloritis) fragilis*, Gude (VII. p. 70, pl. viii. figs. 18–

- 20).—This species is related to *C. oscitans*, v. Mart., which has hitherto been referred to *Acusta*.
- Eulota* (*Plectotropis*) *amula*, Gude (vii. p. 71, pl. viii. figs. 9–11).—This is *H. conella*, A. Ad., 1868, as defined by von Martens, Conch. Mittheil. pl. xviii. figs. 8–12. Not *H. conella*, Pfr., 1861.
- (*Euhadra*) *sericea*, Gude (vii. p. 74, pl. viii. figs. 12–14).—This is the true *E. Blakeana*, Newc., of which I have examined the types.
- Macrochlamys fulgens*, Gude (vii. p. 75, pl. viii. figs. 24–26).
- Arnouldia nahaensis*, Gude (vii. p. 75, pl. viii. figs. 21–23).—Belongs to the genus *Kaliella*.
- Crystallus sulcatus*, Gude (xii. p. 399).
- *velatus*, Gude (xii. p. 399).
- Microcystis Hirasei*, Gude (xii. p. 400).—A synonym of *Macrochlamys micrograpta*, Pils.
- Trishoplita cretacea*, Gude (xii. p. 400).
- Plectotropis conica*, Gude (xii. p. 400).
- Blanfordia japonica*, “A. Ad.,” Möllendorff (xiii. p. 153).—This is *B. Bensoni*, var. *minor*, Pils., not the true *B. japonica*, A. Ad., which was described in this Journal.
- Kaliella elata*, Gude (xiv. p. 453).—This seems to be a variety of *Sitala circumcincta*, Reinh.
- *crenulata*, Gude (xiv. p. 453).
- *pagoduloides*, Gude (xiv. p. 453).
- Pyramidula pretiosa*, Gude (xiv. p. 454).
- Trishoplita dacostæ*, Gude (xiv. p. 454).
- *tosana*, Gude (xiv. p. 455).
- Eulota* (*Euhadra*) *grata*, Gude (xiv. p. 455).—With var. *zonata*, Gude, t. c. p. 456.
- (*Plectotropis*) *kiusiuensis*, Pilsbry (xv. p. 79).
- Trishoplita Goodwini*, var. *suprazonata*, Pilsbry (xv. p. 80).—A synonym of *T. tosana*, Gude, published three days earlier.
- Ganesella turrita*, Gude (vii. p. 75, pl. viii. figs. 1, 2).—Probably, as Mr. Gude suggests, a species of *Buliminopsis*.
- Eulota* (*Plectotropis*) *lepidophora*, Gude (vii. p. 76, pl. viii. figs. 3–5).
- (—) —, var. *tenuis*, Gude (l. c.).
- Satsuma brunnea*, Möllendorff (viii. p. 107).—Probably identical with *Ganesella ferruginea*, Pils.
- Euhadra lukuana*, subsp. *tsushimana*, Möllendorff (viii. p. 108).
- Buliminus rugulosus*, Möllendorff (viii. p. 108).
- Clausilia* (*Euphædusa*) *oncauchen*, Möllendorff (viii. p. 109).
- Pupinella Fruhstorferi*, Möllendorff (viii. p. 110), with var. *tsushimana*.—Scarcely distinct from *P. rufa*.
- Clausilia hakonensis*, Pilsbry (ix. p. 443, pl. xiv. figs. 1–3).
- *awajiensis*, Pilsbry (ix. p. 444, pl. xiv. figs. 15–17).
- *subaurantiaca*, Pilsbry (ix. p. 444, pl. xiv. figs. 5–7).
- *aulacophora*, Pilsbry (ix. p. 445, pl. xiv. figs. 18–20).
- *Hirasei*, Pilsbry (ix. p. 446, pl. xiv. figs. 8–11).

- Clausilia hyperoptyx*, Pilsbry (ix. p. 446, pl. xiv. figs. 12-14).  
 — *japonica*, var. *surugæ*, Pilsbry (ix. p. 447, pl. xiv. fig. 4).—  
 Seems to me to = *Cl. oostoma*, Mlldff. Cf. *Cl. eurystoma*, var. *brachyptycha*, below.  
*Eulota Gudeana*, Pilsbry (x. p. 60).—Probably a subspecies of *E. Gainesi*, Pils.  
 — — *hakodatensis*, Pilsbry (x. p. 60).—New name for *Helix læta*, Gld., non Pfr.  
 — *callizona Dixoni*, Pilsbry (x. p. 60).  
*Arnouldia ceratodes*, Gude (xii. p. 398).—Very closely related to *Microcystina labilis*, Gld., but smaller and more polished. It seems to be a *Microcystina*.  
 — *nanodes*, Gude (xii. p. 399).—The generic position of this and the two species following is doubtful. I have seen none of them.  
*Kaliella symmetrica*, Pilsbry (xv. p. 80).—A synonym of *K. pagoduloides*, Gude, which was published three days earlier.  
 — *fraterna*, Pilsbry (xv. p. 81).  
*Euconulus Reinhardti*, Pilsbry (xv. p. 81).—A *Kaliella*.  
*Punctum japonicum*, Pilsbry (xv. p. 82).  
*Diplommatina uzenensis*, Pilsbry (xvi. p. 88).  
*Eulota callizona*, var. *maritima*, Gulick & Pilsbry (xvi. p. 88).  
 — *luhuana*, var. *idzumonis*, Pilsbry & Gulick (xvi. p. 89).  
 — —, var. *aomoriensis*, Gulick & Pilsbry (xvi. p. 89).  
*Trishoplita Goodwini*, var. *kyotoensis*, Pilsbry (xvi. p. 90).  
*Eulota mercatoria*, var. *atrata*, Pilsbry (xvi. p. 91).  
*Clausilia comes*, Pilsbry (xvii. p. 673, pl. xxiv. figs. 1-3).  
 — *monelasmus*, Pilsbry (xvii. p. 674, pl. xxiv. figs. 4-6).  
 — *iotaptyx*, Pilsbry (xvii. p. 674, pl. xxiv. figs. 7-9).  
 — *mikado*, Pilsbry (xvii. p. 676, pl. xxiv. figs. 10-12).  
 — *brevior*, var. *Addisoni*, Pilsbry (xvii. p. 677).  
 — *hondana*, Pilsbry (xvii. p. 677, pl. xxiv. figs. 13-18).  
 — *subjaponica*, Pilsbry (xvii. p. 678).  
 — *Nolani*, Pilsbry (xvii. p. 679, pl. xxv. figs. 19-21).  
 — *tosana*, Pilsbry (xvii. p. 680, pl. xxv. figs. 22-25, 41).  
 — *shikokuensis*, Pilsbry (xvii. p. 681, pl. xxv. figs. 30-32).  
*Eulota (Ægista) mimula*, Pilsbry (xviii. p. 107).  
*Trishoplita cretacea*, var. *bipartita*, Pilsbry (xviii. p. 107).  
*Eulota (Plectotropis) elegantissima*, var. *cara*, Pilsbry (xviii. p. 107).  
*Clausilia euholostoma*, Pilsbry (xviii. p. 108).  
 — *japonica*, var. *interplicata*, Pilsbry (xviii. p. 108).  
 — *perpallida*, Pilsbry (xviii. p. 108).  
 — *harimensis*, Pilsbry (xviii. p. 108).  
 — *hokkaidoensis*, Pilsbry (xviii. p. 108).—This seems to be a subspecies of *C. perpallida* of Hondo Island.  
 — *iotaptyx*, var. *clava* (xviii. p. 108).  
 — *Hiraseana*, Pilsbry (xix. p. 115).  
*Trishoplita Smithiana*, Pilsbry (xix. p. 116).  
*Ganesella myomphala*, var. *omphalodes*, Pilsbry (xix. p. 116).



- Ganesella Wiegmanniana*, Pilsbry (xix. p. 116).  
*Helicina osumiensis*, Pilsbry (xx. p. 127).  
 — *Reinii*, var. *uzenensis*, Pilsbry (xx. p. 128).  
*Vertigo Hirasei*, Pilsbry (xx. p. 128).  
*Buliminus callistoderma*, var. *ogasawaræ*, Pilsbry (xx. p. 128).  
 — *eucharistus*, Pilsbry (xx. p. 128).  
 — *luchuanus*, Pilsbry (xx. p. 129).  
*Eulota (Ægista) Martensiana*, Pilsbry (xx. p. 129).  
 — (*Plectotropis*) *inornata*, Pilsbry (xx. p. 129).  
*Gastrodontella japonica*, Möllendorff (xxi. p. 38).—A synonym of *Kaliella multivolvis*, Pils.  
*Buliminus (Subzebrinus) nipponicus*, Möllendorff (xx. p. 40).—A synonym of *B. Hirasei*, Pils.  
*Clausilia (Stereophædusa) eurystoma*, subsp. *brachyptycha*, Möllendorff (xx. p. 41).—This is *C. japonica*, var. *surugæ*, Pils., which I subsequently (xvii. p. 677) thought to be *C. oostoma*, Möll.  
 — (*Megalophædusa*) *Fultoni*, subsp. *clavula*, Möllendorff (xx. p. 41). = *C. subjaponica*, Pilsbry\*.  
 — (*Hemiphædusa*) *breviluna*, Möllendorff (xx. p. 42). = *C. aulacophora*, Pilsbry.  
 — (—) *omiensis*, Möllendorff (xx. p. 42). = *C. mikado*, Pils.  
*Diplommatina (Sinica) minutissima*, Möllendorff (xx. p. 44). = *D. pusilla*, var. *omiensis*, Pilsbry.  
*Georissa japonica*, Möllendorff (xx. p. 45).—This seems to be *G. japonica*, Pilsbry.  
*Succinea ogasawaræ*, Pilsbry (xxi. p. 195).  
 — *punctulispira*, Pilsbry (xxi. p. 195).

Total, 129 new species and varieties, of which 22 are known to be absolute synonyms, while perhaps a half-dozen more are doubtfully distinct.

### Bibliography.

[Note.—For publications prior to 1900 see Gude's papers II. and VII.]

- I.—“Additions to the Japanese Land-Snail Fauna,” by H. A. Pilsbry. Proc. Acad. Nat. Sci. Philad. for 1899, pp. 525-530, pl. xxi. (Issued February 12, 1900.)
- II.—“Notes on a Collection of Helicoid Land-Shells from Japan and the Loo Choo Islands, with Descriptions of Two new Species of Helicidæ,” by G. K. Gude. Proc. Malac. Soc. London, iv. pp. 8-23, pl. ii. (Issued late in March 1900. My copy was received in Philadelphia, April 12.)
- III.—“Notices of some new Japanese Mollusks,” by H. A. Pilsbry. Nautilus, xiv. pp. 11, 12. (Issued May 1, 1900.)
- IV.—Ditto. Nautilus, xiv. pp. 32, 33. (Issued July 1, 1900.)

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\* The clausilium of *C. subjaponica* is strongly curved distally and much thickened at the apex. In *C. Fultoni*, as in *C. vasta*, it is not much curved distally, and is not thickened at the apex. I therefore believe the species to belong to the section *Stereophædusa*, and not to *Megalophædusa*.

- v.—“Diagnosen einiger neuer japanischer Landschnecken,” von Paul Ehrmann. Zool. Anzeiger, xxiii. no. 619, pp. 379-383. (Issued July 9, 1900.)
- vi.—“Notices of new Japanese Land-Snails,” by H. A. Pilsbry. Proc. Acad. Nat. Sci. Philad. for 1900, pp. 381-384. (Issued August 9, 1900.)
- vii.—“Further Notes on Helicoid Land-Shells from Japan, the Loo Choo and Bonin Islands, with Descriptions of Seven new Species,” by G. K. Gude. Proc. Malac. Soc. London, iv. pp. 70-80, pl. viii. (Issued August 1900.)
- viii.—“Landschnecken von den Inseln Tsushima und Iki, Westjapan,” von Dr. O. v. Möllendorff. Nachrbl. d. deutschen malak. Ges. xxxii. nos. 7, 8, pp. 107-111. (Issued August 1900.)
- ix.—“Additions to the Japanese Land-Snail Fauna, II.,” by Henry A. Pilsbry. Proc. Acad. Nat. Sci. Philad. for 1900, pp. 443-448, pl. xiv. (Issued August 29, 1900.)
- x.—“On some Japanese Land-Snails,” by H. A. Pilsbry. Nautilus, xiv. pp. 59, 60. (Issued Sept. 1, 1900.)
- xi.—“Mollusques de l'Archipel de Bonin,” par M. C. F. Ancey. Journal de Conchyliologie, xlviii. no. 3, pp. 423-428.
- xii.—“Descriptions of new Species of Japanese Land-Shells,” by G. K. Gude. Ann. & Mag. Nat. Hist. (7) vi. pp. 398-401. (Issued Oct. 1, 1900.)
- xiii.—“*Blanfordia*, A. Ad.,” von Dr. O. v. Möllendorff. Nachrbl. der deutschen malak. Ges. xxxii. pp. 153, 154. (October 1900.)
- xiv.—“Descriptions of new Species of Japanese Land-Shells,” by G. K. Gude. Ann. & Mag. Nat. Hist. (7) vi. pp. 453-456. (Issued Nov. 1, 1900.)
- xv.—“New Species of Japanese Land-Mollusca,” by H. A. Pilsbry. Nautilus, xiv. pp. 79-82. (Issued Nov. 3, 1900.)
- xvi.—“Descriptions of new Japanese Land-Snails,” by H. A. Pilsbry and Addison Gulick. Nautilus, xiv. pp. 88-91. (Issued Dec. 1, 1900.)
- xvii.—“Additions to the Japanese Land-Snail Fauna, III.,” by Henry A. Pilsbry. Proc. Acad. Nat. Sci. Philad. for 1900, pp. 672-683, pls. xxiv., xxv. (Pages 672-676 issued Dec. 29, 1900; pp. 677-683 issued Jan. 28, 1901.)
- xviii.—“Notices of some new Japanese Land-Snails,” by H. A. Pilsbry. Nautilus, xiv. pp. 107, 108. (Issued Jan. 1, 1901.)
- xix.—“Notices of some new Japanese Land-Snails,” by H. A. Pilsbry. Nautilus, xiv. pp. 115-117. (Issued Feb. 1, 1901.)
- xx.—“Notices of new Japanese Land-Snails,” by H. A. Pilsbry. Nautilus, xiv. pp. 127-129. (Issued March 1, 1901.)
- xxi.—“Neue und kritische Landschnecken von Japan und den Liukiu-Inseln,” von Dr. O. von Möllendorff. Nachrbl. der deutschen malak. Gesellschaft, nos. 3, 4, 1901. (Issued in April 1901.)
- xxii.—“New Mollusca from Japan, the Loo Choo Islands, Formosa, and the Philippines,” by Henry A. Pilsbry. Proc. Acad. Nat. Sci. Philad. for 1901; terrestrial species on pp. 193-195. (Issued May 2, 1901.)

II.—*Descriptions of Three new Siluroid Fishes of the Genus Synodontis discovered by Mr. W. L. S. Loat in the White Nile.* By G. A. BOULENGER, F.R.S.

*Synodontis caudovittatus.*

Depth of body 3 to  $3\frac{1}{2}$  times in total length, length of head  $3\frac{3}{4}$  to 4. Snout rounded, smooth, as long as or slightly longer than postocular part of head; interorbital region granular, its width 2 to  $2\frac{1}{3}$  in length of head; eye superolateral, its diameter  $4\frac{1}{2}$  to 5 times in length of head; maxillary barbel without fringe,  $1\frac{1}{4}$  to  $1\frac{1}{2}$  length of head; mandibular barbels with long slender branches, those of the inner with tubercular ramifications. Outer mandibular teeth shorter than the eye, 33 to 38. Occipito-nuchal shield obtusely tectiform, with pointed or truncated posterior processes. Humeral process not keeled, sharply pointed, extending as far as nuchal or not quite so far. Dorsal I 7; spine as long as or a little shorter than head, feebly serrated behind, with short or rather long filamentous prolongation. Adipose fin 3 to 4 times as long as deep,  $3\frac{1}{2}$  to 5 times as long as its distance from dorsal. Anal IV 8, rounded. Pectoral spine as long as or a little shorter than head, feebly but distinctly serrated on outer edge, very strongly on inner, reaching or nearly reaching ventral. Latter rounded, extending to or slightly beyond origin of anal. Skin smooth, not villose. Grey, tinged with olive on the head and back; caudal fin whitish, with a deep black band along each lobe; barbels white.

Total length 240 millim.

Several specimens from the mouth of Lake No.

Allied to *S. frontosus*, Vaill. Differs in the total absence of a fringe to the maxillary barbel, the larger eye, the rounded ventrals and anal, and the black bands on the caudal.

*Synodontis filamentosus.*

Depth of body equal to length of head, 4 times in total length. Snout obtusely conical, smooth, as long as postocular part of head; interorbital region rugose, its width  $\frac{1}{3}$  length of head; eye superior, its diameter  $3\frac{1}{2}$  times in length of head; maxillary barbel broadly fringed at the base,  $\frac{4}{5}$  length of head; mandibular barbels with numerous long ramified branches. Outer mandibular teeth barely  $\frac{1}{4}$  length of eye, 20 in number. Occipito-nuchal shield obtusely tecti-

form, with obtusely pointed posterior processes. Humeral process not keeled, rounded behind, extending as far as nuchal. Dorsal I 7; spine as long as head, feebly serrated behind, with a filamentous prolongation the length of which somewhat exceeds that of the spine. Adipose fin  $4\frac{1}{2}$  times as long as deep,  $2\frac{2}{3}$  times as long as its distance from dorsal. Anal IV 7, rounded. Pectoral spine nearly as long as head, moderately serrated on outer edge, very strongly on inner, not quite reaching ventral. Latter rounded, not reaching anal. Skin smooth, not villose. Greyish above, with small scattered darker spots, white beneath; fins whitish, with small greyish spots on the dorsal and caudal; dorsal filament and upper and lower borders of caudal black; barbels white.

Total length 180 millim.

A single specimen from the mouth of Lake No.

Most nearly allied to *S. serratus*, Rüpp., with which it agrees in the form of the barbels. Distinguished by fewer mandibular teeth, a shorter snout, a larger eye, the absence of denticulation on the anterior border of the dorsal spine, the very long dorsal filament, and the coloration.

*Synodontis eupterus.*

Depth of body 3 times in total length, length of head 4 times. Snout rounded, granular near the eyes, as long as postocular part of head; interorbital region granular, its width not quite  $\frac{1}{2}$  length of head; eye supero-lateral, its diameter  $3\frac{2}{3}$  times in length of head; maxillary barbel distinctly fringed at the base,  $1\frac{2}{3}$  length of head; mandibular barbels with long slender branches, those of the inner with tubercular ramifications. Outer mandibular teeth barely  $\frac{1}{4}$  length of eye, about 50 in number. Occipito-nuchal shield obtusely tectiform, with obtuse posterior processes. Humeral process not keeled, obtuse-pointed, extending as far as nuchal. Dorsal I 9, remarkable for its great depth, the spine and the fine anterior soft rays being prolonged into long filaments; spine longer than head, feebly serrated behind; second soft ray  $2\frac{1}{2}$  as long as head. Adipose fin  $2\frac{1}{2}$  times as long as deep, narrowly separated from dorsal. Anal IV 8, pointed. Pectoral spine as long as dorsal, moderately serrated on outer edge, very strongly on inner, not quite reaching ventral. Latter pointed, reaching origin of anal. Upper lobe of caudal much produced. Skin smooth, not villose. Dark grey-brown, with a few round blackish spots on the head, back, and adipose fin; fins grey, with numerous small round black spots; fringe of maxillary barbels black.



Total length 170 millim.

A single specimen from the mouth of Lake No.

Well characterized by the extraordinary development of the dorsal fin.

Among the *Synodontis* obtained by Mr. Loat in the White Nile I may mention *S. frontosus*, Vaill., *S. nigrita*, C. & V., *S. sorex*, Gthr., *S. batensoda*, Rüpp., and *S. membranaceus*, Geoffr. Having examined a good number of specimens of the latter two species, from the Nile and Senegal, I wish to point out that *S. membranaceus*, Vaill., = *S. batensoda*, Rüpp., and *S. Guentheri*, Vaill., = *S. membranaceus*, Geoffr. The second differs from the first, in addition to the narrower isthmal space, by the much larger size, the lower number of mandibular teeth, the broader fringe to the maxillary barbels, the presence of a fringe on the outer mandibular barbels, and the absence of a serration to the operculum.

III.—*Diagnoses of Four new Fishes discovered by Mr. J. E. S. Moore in Lakes Albert and Albert Edward*. By G. A. BOULENGER, F.R.S.

*Barbus Eduardianus*.

D. 12. A. 8. L. lat. 35. L. tr.  $6\frac{1}{2}$ .

Depth of body  $3\frac{1}{3}$  times in total length, length of head  $3\frac{2}{3}$  times. Snout rounded, nearly twice as long as eye, which is  $6\frac{1}{3}$  times in length of head and  $2\frac{1}{2}$  in interorbital width; barbels two pairs, subequal, nearly as long as eye. Third dorsal ray very strong, bony, not serrated. Longest anal ray  $\frac{2}{5}$  length of head. Pectorals reaching base of ventrals. Ventrals entirely in advance of origin of dorsal. Caudal peduncle  $1\frac{2}{3}$  as long as deep. 3 scales between lateral line and root of ventral. Olive-brown above, golden beneath, the scales darker at the base.

Total length 430 millim.

Albert Edward Nyanza. A single specimen.

*Barbus Fergusonii*.

D. 12. A. 7. L. lat. 36–37. L. tr.  $5\frac{1}{2}$ .

Depth of body 4 to  $4\frac{1}{2}$  times in total length, length of head  $4\frac{1}{2}$  times. Snout rather pointed, nearly twice as long as eye, which is 5 to  $5\frac{1}{2}$  times in length of head and  $1\frac{2}{3}$  to 2 in inter-

orbital width; barbels two pairs, posterior a little longer than anterior and a little longer than eye. Third dorsal ray very strong, bony, not serrated. Longest anal ray  $\frac{3}{4}$  or  $\frac{4}{5}$  length of head. Pectorals not reaching base of ventrals. Ventrals below anterior rays of dorsal. Caudal peduncle  $1\frac{2}{3}$  as long as deep.  $2\frac{1}{2}$  scales between lateral line and root of ventral. Dark olive-brown above, lighter beneath, the scales darker at the base.

Total length 260 millim.

Two specimens from the Albert Edward Nyanza.

Named in honour of Mr. Malcolm Ferguson, the geologist attached to the expedition which has yielded such interesting ichthyological results.

Both this and the preceding species are nearly related to *B. altianalis*, Blgr., from Lake Kivu, and also to some of the species described by Rüppell from Lake Tana, especially *B. affinis* and *B. elongatus*.

#### *Clarias Moorii*.

Allied to *C. lazera*, C. & V., *C. Robecchii*, Vincig., and *C. anguillaris*, Hasselq. (*C. Hasselquistii*, C. & V.). Agreeing with the first in the closely-set and very numerous gill-rakers (80 on the anterior arch), with the second in the wide interspace ( $\frac{1}{6}$  length of head) between the dorsal and caudal fins, with the third in the form and disposition of the vomerine teeth, which are mostly conical and constitute a long crescentic band, which is nowhere wider than the præmaxillary band. Nasal barbel  $\frac{1}{5}$  length of head; maxillary barbel  $\frac{2}{3}$ , barely reaching base of pectoral spine; occipital process acutely pointed, a little longer than broad. D. 66; A. 43.

Total length 590 millim.

Albert Nyanza. A single specimen.

#### *Petrochromis Andersonii*.

D. XVI 13. A. III 10. Sq.  $32\frac{4}{16}$ . L. lat. 21/13.

Depth of body  $2\frac{1}{4}$  times in total length, length of head 3. Diameter of eye  $4\frac{2}{3}$  times in length of head; mouth extending to between nostril and eye; teeth extremely numerous, forming very broad bands in both jaws; 3 series of scales on the cheek; 25 gill-rakers on lower part of anterior arch. Last dorsal spine much longer than middle ones. Pectoral much longer than head, reaching a little beyond origin of anal. Caudal truncate, very slightly emarginate. Olive above, the scales darker at the base; yellowish beneath,

mottled with brown and mother-of-pearl; spinous dorsal and anal with numerous dark horizontal streaks; soft dorsal and caudal with round light spots on a dark ground, the edge of the fins bright yellow.

Total length 420 millim.

Albert Edward Nyanza. A single specimen.

This fine fish, one of the largest of the family Cichlidæ, is named in memory of Dr. John Anderson. It is closely allied to *P. Tanganicæ*, Gthr., from which it differs in the last dorsal spine being much longer than the middle ones.

IV.—*On the Occurrence of Salmo macrostigma in Sardinia.* By G. A. BOULENGER, F.R.S.

THE British Museum has just received from Lieut. H. G. S. Sandeman, R.N., several specimens, measuring from  $6\frac{1}{2}$  to 13 inches, of the river-trout of Sardinia, which, referred to by Cetti ('Anf. e Pesci di Sardegna,' p. 74) as "*La Trota Sarda*" and by Carruccio (Atti Soc. Ital. xii. 1869, p. 569) as *Trutta fario*, does not appear to have ever been carefully examined or compared with examples from other parts. It may therefore be interesting to place on record that these specimens agree in every respect with the form of *Salmo trutta* which occurs in the rivers of the Atlas of Algeria and Morocco, and which has been described by Aug. Duméril as *Salar macrostigma* (Rev. et Mag. de Zool. 1858, p. 396, pl. x.). The species was based on young examples from the rapid streams of the Wed-el-Abaïch, in Kabylia, and the name *macrostigma* was suggested by the parr-marks along the sides of the fish: the name remains an appropriate one, since it is characteristic of this variety to retain them throughout life; at least they can be traced more or less distinctly in specimens up to 13 inches long. The Sardinian Trout agree in every respect with Algerian and Moroccan specimens in the Museum, even in the low number of pyloric appendages, of which I count only about twenty. The caudal fin is deeply emarginate in the young, feebly in the adult. The maxillary extends to below the posterior border of the orbit or a little beyond. 10 to 12 gill-rakers on lower part of anterior arch. 15 scales between the posterior extremity of the adipose fin and the lateral line. A large round black spot on the cheek, on a level with the centre of the eye.

## V.—Description of a new Lizard from the Gaboon.

By G. A. BOULENGER, F.R.S.

*Mabuia benitensis*.

Snout moderate, pointed. Lower eyelid with an undivided semitransparent disk. Nostril behind the vertical of the suture between the rostral and the first labial; a postnasal; anterior loreal in contact with the first labial; supranasals in contact behind the rostral; frontonasal broader than long, in contact with the frontal; latter as long as the frontoparietals and interparietal together, in contact with the second and third supraoculars; four supraoculars, second largest; six or seven supraciliaries; parietals just meeting behind the interparietal; a pair of nuchals; subocular between the third and fourth or fourth and fifth upper labials, about twice as long as these shields, not narrowed inferiorly. Ear-opening oval, smaller than the eye-opening, with three or four very minute lobules on its anterior border. Dorsal and lateral scales quincuncinate, the outer keels short; nuchals sex-, septem-, or novemcarinate; 28 or 30 scales round the middle of the body, subequal. The hind limb reaches the wrist or the elbow of the adpressed fore limb. Subdigital lamellæ smooth. Tail not twice as long as head and body. Greyish brown above, with longitudinal series of blackish spots; a blackish-brown white-edged lateral band extending from the end of the snout to the base of the fore limb; the lower white streak is broader than the upper, borders the upper lip, and is itself black-edged from below the ear; limbs with small whitish spots; lower parts uniform whitish.

	millim.
Total length .....	198
Head .....	16
Width of head .....	11
Body .....	60
Fore limb .....	24
Hind limb .....	33
Tail .....	124

Two specimens from the Benito River, French Congo, collected by Mr. G. L. Bates.

Very closely allied to *M. maculilabris*, Gray. Distinguished by the more pointed snout, the greater number of supraciliary shields, and the shorter outer keel on the dorsal scales.



VI.—*New Genera and Species of Eastern and Australian Moths.* By Colonel C. SWINHOE, M.A., F.L.S., &c.

[Concluded from vol. vii. p. 501.]

Family **Hypenidæ.**

Subfamily *DELTOIDINÆ.*

Genus **AMILAGA**, nov.

= *Lucia*, Walker, xiii. 1113 (1857) (præocc.).

Differs from *Badiza*, *Adrapsa*, *Bocana*, and *Asthala* in the palpi of the male having short stiff hair on the outer side of the second joint, the third joint rather short, smooth, with a thickening like a flattened club at the tip; no tuft in front; antennæ with uniseriate rather long pectinations almost to the tips and with a twist in the middle, but not knotted or thickened; in the female the third joint of the palpi are sickle-shaped and the antennæ are minutely ciliated.

*Amilaga geometroides.*

*Lucia geometroides*, Walker, xiii. 1112 (1857).

*Adrapsa geometroides*, Hmps. Moths Ind. iii. p. 38 (1895).

Sarawak, Borneo, Gilolo. Examples of both sexes.

Walker's type specimen in Deltoid drawer no. 1 in the B. M. collection is a female from Ceylon, and with it are four examples of *Adrapsa subapicalis*, Moore; in the male of this insect the antennæ has long bristles and cilia, consequently Hampson has so described the male of *geometroides*; in the same drawer are three unnamed males from Borneo, the third of these is a male *geometroides*.

The type of the genus *Adrapsa* is *ablualis*, Walker, Hampson's no. 2801, p. 37, but it is not the same as *Bocana subapicalis*, Moore, as Hampson says the antennæ of the male of the former have uniseriate pectinations, and of the latter long bristles and cilia.

*Daxata lintona*, nov.

♂. Brown, tips of the palpi with a black band of hairs: fore wings with five dark brown, thin, transverse bands of lunular-like marks, with pale outer edgings—the first near the base, the others at equal distances apart, the fifth pale and close to the margin; an indistinct brown stigma at end of cell: hind wings with a subbasal band; a medial band outwardly curved at the middle, then straight to below the middle of the abdominal margin; a submarginal band like

that on the fore wing; a lunule at the end of cell; both wings with pale ochreous marginal thin festoon and dark brown cilia: underside of a uniform dark brown colour, with somewhat prominent nervular and internervular lines.

Expanse of wings  $\frac{7}{16}$  inch.

S.E. Borneo (*Doherty*).

Allied to *D. bijungens*, Walker.

There are seven examples of this species in the B. M. from Borneo unnamed in Deltoid drawer no. 25.

*Zanclognatha moloalis*.

*Bocana moloalis*, Walker, xix. 887 (1859).

*Hydrillodes lentalis*, Hmps. (part.), Moths Ind. iii. p. 53 (1895).

*Bertula partita*, Hmps. Ill. Typ. Lep. Het. B. M. viii. p. 99, pl. cxlviii. fig. 13 (1891).

*Bleptina partita*, Hmps. Moths Ind. iii. p. 45.

Sarawak, Borneo.

The type specimen is a female from Sarawak; the type of *partita* is a female from the Nilgiri Hills. Hampson sank *moloalis* as one of the synonyms of the common *Hydrillodes lentalis*; but I have now several of both sexes from Sarawak and the Khasia Hills, and there are two males in the B. M. from Ceylon; the females vary somewhat in colour, but some of them are identical with Walker's and Hampson's types, and there can be no manner of doubt that the two sexes belong to the same species.

The male differs from the female in having a much larger tuft of hair on the inner side of the third joint of the tarsi and in having the discal pale line of fore wings less curved and sinuous.

*Pseudocraspedia* (?) *addescens*, nov.

♂. Uniform ochreous fawn-colour; palpi black above and at the tips; collar black: fore wings with a black spot in middle of cell, another at the end, two in the disc beyond the cell, and two parallel to them near the margin; costa with several black spots, three of them being close together near apex; marginal line concolorous with the wing, with black spots in the interspaces: hind wings with submarginal and marginal rows of short black lunular spots and a spot at end of cell: underside paler, with the nervular and internervular lines prominent, with black cell-spot, costal and outer marginal spots.

Expanse of wings  $\frac{8}{16}$  inch.

Coomoo, Queensland.

In shape this species is like a *Craspedia*.

*Pseudocraspedia (?) longipalpis*, nov.

♂. Of a uniform ochreous fawn-colour; palpi much exaggerated, first and second joints black on the upperside, second and third joints with black bands near the tips; thorax with a black dot in the centre behind the collar; abdomen with brown suffusion on the three middle and terminal segments: fore wings with a black dot in middle and one at end of cell, one at the base, three subbasal in a triangle, two discal (one near apex and the other below the middle), several on the costa, well separated, except towards the apex, where there are three or four close together: hind wings with a dot at end of cell, two or three outside the cell and less distinct; both wings with submarginal dots in the interspaces, close to the marginal line, which is black and sinuous: underside paler, without any distinct markings; fore wings with the outer portions suffused with brown.

Expanse of wings  $1\frac{2}{10}$  inch.

Sarawak, Borneo.

Fore wing rather longer than usual, the hinder margin being nearly as long as the costa.

*Cacyparis ceira*, nov.

♀. Palpi yellow, its upperside with a brown stripe, terminal joint brown; head, thorax, and fore wings greyish purple, irrorated with minute grey atoms and having a glossy tinge; space between the antennæ with some silvery scales; a thin band of similar scales across the thorax: fore wings with a short basal band of silvery scales, and some on the hinder margin; a brown spot at end of cell, a short straight band from costal third, a spot on costa beyond the middle, one opposite the cell, one above middle of hinder margin, and a subapical costal streak, all covered with silvery scales; a large subapical black ocellus with a yellow ring, a similar ocellus on middle of hinder margin, and some marginal grey lunules with silvery scales running down the margin: hind wings yellow, without markings: underside, body, legs, and wings dull yellow; fore wings with a broad discal brown band, touching neither the costa nor the hinder angle.

Expanse of wings  $1\frac{1}{2}$  inch.

Gilolo (*Doherty*).

Allied to *C. elegans*, Butler, which, however, has a broad whitish band on fore wing from before centre of costa to hinder angle.

Subfamily *HYPENINÆ*.

*Marapana iuga*, nov.

♂ ♀. Ochreous fawn-colour, second joint of the palpi with two blackish stripes, last joint with two black bands: fore wings with some black dots on the costa at even distances apart, three or four in the inner portion of the wing; reniform stigma large, round, dark red ringed with black; a cluster of black scales on its outer sides and two short black streaks above in a line with the apex, with a few black subcostal points above it; marginal points also black: hind wings blackish grey, paling towards the base; cilia of both wings greyish ochreous: underside with the fore wings uniform dull brown, with some black dots on outer half of costa; hind wings ochreous grey; a black cell-spot, medial and discal incomplete brown transverse lines; both wings with marginal black points and greyish ochreous cilia.

Expanse of wings  $1\frac{1}{10}$  inch.

Sarawak, Borneo.

In some of the specimens the black apical streak on the fore wings is more or less obsolete.

Genus *HETERORMISTA*, nov.

Fore wing with costa nearly straight, very slightly incurved in the middle, shortly but strongly depressed before apex; outer margin distinctly elbowed at vein 4, slightly crenulate; hind wing with rounded outer margin, the anal angle obliquely truncate, the abdominal margin short; antennæ of male strongly pectinate for three fourths its length, of female simple, filiform; forehead with a prominent tuft of scales; palpi as in the genus *Hypena*, long, porrect, laterally flattened, fringed with hair above and below; tongue and frenulum present; pectus and femora somewhat hairy; hind tibiæ with four spurs. Fore wing with the cell half the length of the wing; discocellular vertical, slightly inangulated; median vein shortly bent upwards at extremity, vein 2 at two thirds, 3 from the bend, close before 4, 5 just above 4, 6 from upper angle, 7, 8, and 9 stalked from upper angle, 10 from two thirds anastomosing with 11, closely approximated to 10 throughout, but not anastomosing: hind wings with the cell shorter than half the wing; costal well separated from subcostal, veins 6 and 7 and 3 and 4 from the angles of the cell, 5 well above 4.

*Heterormista modesta*, nov.

♂ ♀. Greyish fawn-colour, with very sparse black irro-



rations: fore wings with the basal and medial lines very slightly marked except by black costal dots, outcurved in the middle; outer line from three fifths of costa to two thirds of hinder margin, paler than the ground-colour, edged inwardly by blackish scales, oblique outwards to vein 7, then vertical and irregularly sinuous; submarginal line very obscure, indicated by dark dots between the veins; slight dark marginal lunules; cilia fawn-colour, with the outer half pale and marked by dark specks at the ends of the veins; a pale dot in base of cell, two black dots on discocellular: hind wings with two discocellular dots, larger and more conspicuous; traces of antemedian, postmedian, and submarginal dark lines, all more prominent towards abdominal margin, the submarginal preceded by a more or less conspicuous ochreous shade; the outer half of both wings sometimes darker than the inner: underside, fore wings tinged with brown, and with traces of a diffused dark submarginal shade, not reaching the costa, and in some specimens the discal dots and line are blackish and conspicuous.

The female is paler than the male, slightly tinged with ochreous, and with the dark submarginal fascia of the underside visible through the wing.

Expanse of wings  $1\frac{1}{10}$  inch.

Dawson, Queensland.

*Bomolocha herpa*, nov.

♂ ♀. Palpi, head, body, and wings olive-brown, with a chocolate tinge: fore wings to a little beyond the middle dark chocolate-brown, limited by a nearly upright straight blackish line, with prominent outer white edge; a black spot outwardly white-edged in the cell; a black spot at the end of the cell, touching the outer side of the white edge of the transverse line; a discal row of black points, with white on their outer sides, pale marginal points, and brown marginal line to both wings: hind wings brown, without markings: underside brownish grey; a black subapical dot with white on its outer side on fore wings, a black cell-spot on hind wings, indications of a discal line on both wings, and a submarginal grey-brown band on hind wings.

Expanse of wings  $1\frac{1}{10}$  inch.

Port Blair, Andamans.

Superficially like *Harita rectilinea*, Moore. There is an example from Sikkim in the B. M. mixed up with *B. obstupidalis*, Swinh., and another from the Khasia Hills with *B. obfuscalis*, Hmps.; but the central band is straighter, more erect, and differently situated.

*Bomolocha tuma*, nov.

♂. Brown, with a pinkish tinge; second joint of palpi black at the tips, third joint white at the tips: fore wing with a white dot at end of cell; a large blackish central space, which narrows into an angle on the hinder margin, limited on its inner side by a line from costal fifth to near hinder margin beyond the middle, and on its outer side by a perpendicular black line with white outside edge, which is outwardly angled, once above the middle and twice below it; an indistinct similarly shaped pale brown line a little beyond, the space between being pale grey; a large blackish-brown apical patch, in which is a whitish apical streak, two white spear-pointed marks, and four pale costal dots; marginal points whitish; some similar points at the extremity of the interlined brown cilia: hind wing with a blackish-brown marginal line and a black patch at the anal angle, partly on the cilia and partly on the margin; cilia brown and interlined.

Expanse of wings  $1\frac{3}{10}$  inch.

Jaintia Hills.

Examples of this species from Borneo and Singapore are in the B. M. collection unnamed.

## Genus APHYPENA, nov.

Fore wings narrow, elongate; costa evenly curved throughout, apex nearly rectangular; outer margin vertical to the end of vein 3, where there is a prominent angle, on either side of which the margin is a little incurved (in the male the outer margin is merely bluntly elbowed), below the angle the margin becomes very oblique, crenulate in the female, the hinder angle well marked; the hinder margin strongly convex along basal half and as strongly concave on the outer half: hind wings semicircular, both angles rounded; in the male the abdominal margin contains a fold of stiff hairs, which are expansible from the base, the wing itself being much narrower than in the female: abdomen reaching well beyond the hind wings, in the male considerably so; the basal segment is tufted above in both sexes, and in the male there is a thick lateral tuft of hairs on the lower surface behind the hind femora, which are also with tufts; frontal tuft prominent; antennæ of male pubescent, with short sparse bristles, of the female simple; palpi porrect; the second joint hairy above and below, the third rostriform, smoother, porrect and drooping; tongue present.

Fore wing: cell three fifths of wing, the discocellular very slender and concave; vein 2 from one half, 3 from five sixths, 4 and 5 close together from lower end of cell, 6 from just below upper angle; areole minute; 9 anastomosing with stem of 7 and 8. Hind wings with vein 2 from two thirds, 3 and 4 close together from end of cell, 5 from little above lower angle, 6 and 7 from upper angle.

Type *Aphypena* (*Hypena*) *dissimulans*, Hmps., Bomb. Nat. Hist. Soc. xi. (4) p. 707 (1898).

The type came from the Khasia Hills.

Khasia Hills; Pulo Laut, Borneo.

### Genus EUCOSMOCARA, nov.

Fore wings elongate, almond-shaped; costa slightly curved; apex obtuse; hind margin obliquely curved; anal angle obtuse: hind wings narrow; abdominal margin running into outer margin without any perceptible anal angle, the outer margin slightly projecting in the middle; palpi porrect, four times as long as the head, laterally flattened, thickly and roughly clothed above, terminal joint fine and pointed; antennæ of male symmetrically plumose, of the female simple and filiform; forehead with a strong tuft of hairs; legs rather thick, hind tibia with four spurs.

Fore wing with the cell three fifths of the wing, vein 2 from two thirds of cell, 3 shortly before 4, 5 close above 4, 6 from below upper angle, 7 and 8 stalked from the angle, 9 and 10 stalked, 11 free: hind wings with 3 and 4, and 6 and 7 stalked, 5 from just below middle of discocellular, cell two thirds length of wing; vein 8 coincident with 7 till nearly end of cell.

### *Eucosmocara plumifera*, nov.

♂ ♀. Antennæ, palpi, head, thorax, and fore wings pale ochreous fawn-colour: fore wings thickly irrorated with grey atoms; two black spots longitudinally placed in the cell, two at the end, and one in the disc beyond; the double spots stand in a small blackish suffused space; two or three black spots in the disc, marginal points black; cilia ochreous, shining; abdomen and hind wings ochreous grey, costal and apical portions of the wing darker grey, cilia slightly ochreous and paler: underside uniform ochreous grey, a brown spot at the end of each cell.

Expanse of wings  $\frac{8}{10}$  inch.

Sarawak, Borneo.

## Genus STENOPALTIS, nov.

Fore wing elongate, narrow; costa nearly straight; apex acute, outer margin oblique, sinuate, curving continuously into the hinder margin, without forming any distinct angle: hind wings very narrow; abdominal margin short, outer margin almost straight; palpi three times as long as the head, porrect, laterally flattened, densely clothed above and below, terminal joint short and pointed; antennæ very slender and segmented, in the female perfectly filiform, in the male finely ciliated; forehead with a slight cone of hairs; tongue and frenulum present; hind tibia with four spurs.

Fore wing with the cell about half the length of the wing; vein 2 from two thirds, 3 a little before end of cell, 5 close above 4, 6 from below upper angle, 7 from the angle, 8, 9, and 10 stalked, 11 free: hind wing with 3 and 4, and 6 and 7 stalked, 5 from just below middle of discocellular.

*Stenopaltis lithina*, nov.

♂ ♀. White, irrorated with grey; a brown spot at the end of each cell: fore wings with the costal border rather broadly speckled with grey, and some brown and white spots on costal edge; both wings crossed by antemedial, medial, and discal duplex brown thin bands, the antemedial band almost obsolete on the hind wings; the veins on fore wings outside the discal band broadly brown; both wings with a brown marginal line and brown points; cilia white, with a brown basal band; abdomen pale brown, with white segmental bands; palpi speckled with grey; head and thorax white.

Expanse of wings  $\frac{6}{10}$  inch.

Coomoo, Queensland.

Superficially much resembles another Australian species, *Aræopteron canescens*, Walker, which has, however, short upright palpi.

*Moscha variabilis*, nov.

♂. Very variable in colour, in some examples dark ochreous brown, and to pale ochreous pink there are many gradations; in some the palpi are brown, in others pink; the head and thorax in two examples are white, but all have exactly the same markings: fore wings with a subbasal black dot and two at the end of cell—an antemedial, outwardly curved, sinuous brown line, a medial straight line, angled behind the two dots acutely inwards to the costa; between these two lines in one example the space is pure white; an angled and sinuous discal line, outwardly curved; an indistinct submarginal line



with white dots on it; a marginal line and a line at the end of the cilia; two brown, nearly obliquely square patches on the costa between apex and middle: hind wings with corresponding lines, but indistinct: underside darker brown, with central straight and discal curved lines, the latter with some rather prominent white spots; in the paler specimens there is a brown suffused patch on hind wings above near the anal angle, and in one example all the lines beyond the middle are obsolete.

Expanse of wings  $\frac{7}{10}$  inch.

Queensland.

Marked somewhat like *Prolophota trigonifera*, Hmps., the colour of which is pure white.

### Family Nymphulidæ.

#### Genus HEMILOBA, nov.

Fore wings very narrow and elongate; the costa strongly convex towards apex, which is depressed; outer margin very oblique to below middle, then strongly insinuate and rounder to the hinder angle: hind wings with the abdominal margin very short; outer margin twice strongly incised, so as to form two lobes—the median broader than the apical, the remainder to anal angle sinuate and truncate: antennæ short, thick, lamellate, finely pubescent, the basal joint swollen; labial palpi porrect; maxillary palpi thickened towards extremity; tongue and frenulum present; hind legs with the tibiæ and tarsi very long, the former with four spurs; the femora short, clothed with a tuft of fuscous and black hairs.

Fore wings with cell two thirds of wing, narrow, the median vein being above the middle of wing, vein 2 shortly before lower angle of cell, 3, 4, and 5 close together from the end, 7 from the upper angle, 6 from just below it, 8, 9, and 10 stalked, 11 free; vein 2 runs shortly into the marginal sinus, terminal third above the submedian fold, with a fringe of hairs: hind wings with veins 6, 7, and 8 ending in the apical lobe, 2, 3, 4, and 5 apparently in the median lobe, but the veins are swollen and contorted, forming a puckered space before margin at inner edge of lobe, the edges of the lobes as well as the outer margin itself with long cilia.

#### *Hemiloba excisa*, nov.

♂. Pale greyish pink: fore wings with a broad white band from base to middle, a white space on costa one third from apex, a black sinuous submarginal line, with a white

band on its inner side below the costa and a white space in the disc: hind wings with a broad white medial band edged with black; a white spot and a cluster of black spots at the margin of the central lobe, indications of one or two black spots on the upper lobe; a short black marginal lobe outwardly edged with white near the anal angle: cilia of both wings grey.

Expanse of wings  $\frac{7}{10}$  inch.

Jaintia Hills.

Somewhat resembling *Aulacodes polydora*, Meyrick, but the exaggerated lobes of the hind wings will easily distinguish it.

*Oligostigma sanguinisecta*, nov.

♂. Bright ochreous, irrorated and marked with bright crimson: fore wings with the costal line black, double for two thirds its length from the base; two or three black longitudinal lines (two of which terminate in white streaks) below the costa, and many crimson longitudinal streaks, all limited by the white discal transverse band, edged with black on its inner side (the white of the band obsolete towards the hinder margin); a similar submarginal complete band, edged with black on both sides, marginal line black; space between the bands bright crimson: hind wings more crimson than the fore wings, the streaks indistinct, but the irrorations more dense; a discal waved transverse black line; four marginal black spots with white on their inner sides on a bright crimson ground—one pair near apex, the other near the middle, from these latter pair is a white marginal band edged with black on both sides; on the inner side of the spots is an indistinct grey band, which is apparently a continuation of the black-bordered white band near the anal angle; cilia of both wings ochreous, with black patches.

Expanse of wings  $\frac{4}{10}$ – $\frac{5}{10}$  inch.

Sarawak, Borneo.

A very beautiful little insect.

Family **Pyraustidæ**.

Subfamily *HYMENIINÆ*.

*Chalcidoptera incommitata*.

*Nagia incommitata*, Swinh. Ann. & Mag. Nat. Hist. (6) xiv. p. 205 (1894).

*Nosophora chironalis*, Hmps. (nec Walker), Moths Ind. iv. p. 289 (1896); Hmps. P. Z. S. 1898, p. 662.

Khasia Hills.

I described a female, which by mistake was stated to be a male; Sir George Hampson sank it to *Nosophora chironalis*, Walker, the type of which is in the Oxford Museum; but, as stated at p. 470, vol. ii. Cat. Het. Mus. Oxon., this was a mistake. I have now two males from the same locality identical with the female type. The species does not belong to the genus *Nosophora*, but seems to me to fit into Section IV. B of Hampson's genus *Chalcidoptera*.

### Subfamily PYRAUSTINÆ.

#### *Pachyzancla submarginalis*, nov.

♂. Of a uniform dull ochreous, irrorated with very minute grey atoms; palpi blackish brown at the sides, lines and spots brown: fore wings with a spot on costa one fourth from base, one in the cell, and another at the end; antemedial and postmedial very fine transverse lines, both sinuous, the former from costal spot outwardly oblique to hinder margin before the middle, the latter from costa at one fourth from apex curved outwards opposite the cell, then inwards below end of cell, then downwards to hinder margin beyond the middle; both these lines have corresponding lines on the hind wing, the inner one indistinct, the outer one shaped as on the fore wing; both wings with a submarginal line and marginal crenulated festoon, close together, the latter dark and distinct, making the border look as if it had a slight marginal band; there is also a cell-spot on the hind wing: underside with the coloration more obscure; cell-spots as above; the outer bands indicated by some dull grey spots; pectus white, body and legs ochreous; fore legs with a black band.

Expanse of wings  $1\frac{6}{10}$  inch.

Sarawak, Borneo.

There is an example of this species in the B. M. from Ké Island placed with *P. hipponalis*, Walker; but from this it is quite distinct.

#### *Pionea acutangulata*, nov.

♂. Of a uniform pale ochreous yellow above: fore wings with four dark ochreous transverse lines, antemedial, medial, discal, and submarginal, the last rather far from the margin and joining the third at the hinder margin near the angle; all the lines smooth and outwardly curved: hind wings with the costal portion white; three transverse similar lines, corresponding to the first, second, and third lines of the fore wing, and all meeting close together at the anal angle; marginal

line of both wings dark ochreous: underside, pectus white, wings without markings, costal line of fore wings brown.

Expanse of wings  $1\frac{1}{10}$  inch.

Jaintia Hills.

Mixed up with *P. ochrealis*, Moore, in some collections, but is of a different shade of colour; the scaling is different, the markings are smoother, and the shape of the fore wing different, the apex being produced to an acute angle.

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VII.—*Some new African Bats (including one from the Azores) and a new Galago.* By OLDFIELD THOMAS.

*Galago gallarum*, sp. n.

Allied to *G. senegalensis*, *teng*, &c., but of a much paler colour.

Size about as in the species above named. Fur close, soft and velvety, the hairs of the back about 8–10 millim. in length. General colour of back nearly Ridgway's "ecru drab," the hairs in detail being dark slaty grey for their basal halves, then fulvous or cinnamon, with a whitish subterminal and a minute black terminal ring. Face rather paler; middle line of muzzle white, bordered on each side with the blackish orbital ring. Ears large, practically naked. Outer side of fore and whole of hind limbs ochre-yellow, paling on the hands and feet to yellowish white. Belly dull white, the hairs slaty based; chin, inner side of fore limbs, and inguinal region clearer white, the hairs white to their bases. Tail pale smoky grey, darkening to black on the terminal brush.

Approximate dimensions of the type (measured in skin):—

Head and body 190 millim.; tail 260; hind foot 66; ear (shrunk) 30.

A second specimen (measured in the flesh) has the following dimensions:—

Head and body 165; tail 225; ear 34.

The skull of the type is unfortunately lost and that of the second specimen much broken, so that only the following measurements can be taken on it:—

Breadth of brain-case on squamosals 22; length of parietal suture 18; upper tooth-row, from front of canine to back of  $m.^3$ , 15; lower tooth-row, from tip of incisors to back of  $m.^3$ , 15; combined length of three lower molars 7.2.

*Hab.* (type). Webi Dau, Boran Galla Country.

*Type.* B.M. no. 0. 3. 27. 1. Collected 19th April, 1897,



and presented by Lord Delamere. The second specimen (a male) was obtained on November 21, 1899, to the south-east of Lake Stephanie, at an altitude of 3000 feet, and was presented by Dr. Donaldson Smith. It is the *Galago galago* of my paper on the latter explorer's collection\*.

This species is no doubt the Somaliland and Gallaland representative of the group of Galagos to which the names *G. galago*, *senegalensis*, *teng*, and *zanzibaricus* have been applied, but is evidently distinct from any of them. From the grey ones it differs by its drab coloration, and from the "zimmet-farbigen" *zanzibaricus* by its yellow limbs and the white subterminal bands to its dorsal hairs.

CLÆOTIS †, gen. nov. (*Rhinolophidæ*).

Allied to *Hipposiderus*, *Asellia*, and *Tricenops*.

Nose-leaf tridentate, its details apparently somewhat as in *Tricenops*.

Ears short, rim-like, almost without tip, their outer and inner edges arising close together.

Thumbs extremely minute.

Tail scarcely projecting from membrane.

Anterior upper premolars present, but minute. Last molars nearly as large as the penultimate.

Nasal part of skull disproportionally small and feeble. Basal region broad between bullæ, without vacuities, strongly ridged laterally.

This bat does not appear to be assignable to any known genus. Its ear-structure, described in detail below, is quite unique, the shape of the ears being in this family very characteristic of the different genera. The complicated tridentate structure of the nose-leaf recalls *Tricenops*, but the proportions of the skull are very different, nor is there any trace of the remarkable vertical expansion of the zygomata present in that bat. Nor do any of the species of *Asellia* show any approximation to *Clæotis*.

It is unfortunate that the two specimens were both sent as skins, so that, although one has been softened, the nose-leaf cannot yet be accurately described in detail, nor can any figure be given.

*Clæotis Percivali*, sp. n.

Size very small, perhaps less than in any other member of the family. General build very light and delicate. Nose-

\* P. Z. S. 1900, p. 802.

† κλοιός, a collar.

leaf with many resemblances to that of *Tricenops*, the posterior part similarly tridentate, the three points thinly hairy; below them in the middle line there is a small median projection, not so long as in *Tricenops*; in front of that, again, there is something representing the anterior median plate in *Tricenops*, but it is produced forwards into two small projecting points; horizontal horseshoe small, a narrow supplementary leaf apparently present. Outside and behind the tridentate leaf, between it and the eyes, there are two small projections covered with long hairs. Ears short, their outer and inner margins rising close together some way behind the eyes; the two margins are symmetrical with each other, rising vertically a short distance, then bending round abruptly and passing straight back to meet each other at the scarcely perceptible tip; the greatest height of the ear behind is only about one fifth higher than the point at which the two margins bend backwards in front. In fact the whole ear is very like a man's "stand-up" collar with the angles in front rounded off.

Wings very delicately made; thumbs quite minute, the terminal part free from the membrane only about 2 millim. long, including the claw. Wings attached to the distal end of the tibiae. Calcars short, reaching only about halfway up the tibiae. Tail apparently of only five joints, the last one scarcely projecting from the membrane, which is acutely pointed behind.

Fur fine, soft, and silky, about 6 millim. long on the back. Face bright buffy; crown greyish; back greyish brown, the hairs uniformly coloured. Hairs of underside slaty grey basally, yellowish white terminally.

Wing and interfemoral membranes uniformly smoky brown.

Skull with the part in front of the orbits much less broad and swollen than in other members of the family, the braincase being disproportionally large. Zygomatic strongly convergent forwards. Palate ending opposite the middle of *m*.<sup>2</sup>. Basal region of skull broad between the bullae, without vacuities, but with two strongly marked divergent ridges running from the base of the pterygoids to the antero-internal corners of the bullae; sphenoidal fissures large and widely open.

Upper incisors spatulate, indistinctly bicuspid. Canines with a small posterior secondary cusp at half their height. Anterior upper premolars minute, crushed in in the outer angle between the approximated canine and posterior premolar. Last molar about four fifths the size in cross-section of the

penultimate molar. Lower incisors tricuspid, overlapping. Anterior lower premolar well developed, two thirds the height of the next.

Dimensions of the type :—

Forearm 31 millim.

Head and body (in flesh) 35; tail 28; ear 8.

Skull: greatest length 13; basal length 9·5; zygomatic breadth 7; breadth above orbits 3·3; interorbital constriction 1·8; mastoid breadth 6·5; front of canine to back of *m.*<sup>3</sup> 3·8.

Dimensions of a specimen softened and put in spirit :—

Forearm 32.

Head and body (c.) 34; tail 26; height of ear behind 5; third finger, metacarpus 26, first phalanx 10·5, second phalanx 14; lower leg 13·5; hind foot (s. u.) 5·5; calcar 8.

*Hab.* Takaungu, N. of Mombasa, British East Africa.

*Type.* Male. B.M. no. 1. 5. 1. 11. Collected 15th February, 1901, and presented by Mr. A. B. Percival.

Mr. Percival is to be congratulated on the discovery of this interesting little bat, which is widely different from anything hitherto known.

*Nycteris aethiopica luteola*, subsp. n.

Similar to the typical form in essential characters, but slightly larger, with longer posterior extremities, and of more yellowish coloration.

Fur soft, fine, and straight, the hairs of the back about 9 millim. in length, considerably longer than those of true *aethiopica*. Humeri and proximal halves of forearms clothed with fur, which also extends on to the wing-membrane. Base of interfemoral membrane and proximal halves of femora also hairy. Below, the fur extends further back on the wing-membrane, but less on the interfemoral than above.

General colour above dull buffy, not far from Ridgway's "clay-colour," browner posteriorly and on the humeri. Individually the hairs are glossy buff, with brown tips. Below, the colour throughout is clear buff, very near Ridgway's pl. v. fig. 13.

Ears and tragus as in true *aethiopica*. Forearms rather longer; tail, lower legs, and feet decidedly longer.

Skull similar to, but rather larger than, that of true *aethiopica*.

Dimensions of the type (in skin) :—

Forearm 56 millim.

Tail (vertebræ) 57; lower leg and foot, including claws, 36.

Skull: greatest length from occiput to tip of canines 22·2;

zygomatic breadth 13; breadth of frontal shield 7·8; upper tooth-row, from front of canine to back of  $m^3$ , 7·5.

The measurements of an adult spirit-specimen are given by Dobson (P. Z. S. 1879, p. 718) under the name of *N. æthiopica*. In that specimen the tail is 59 millim. long and the lower leg and foot 37, just about the same as in the type. On the other hand, in a series of true *æthiopica* from Shendy, Soudan, therefore practically topotypes, the tail does not exceed 53 millim., and the lower leg with foot 33 millim., these measurements being very uniform in all.

*Hab.* Kitui, British East Africa, alt. 3500 feet. Another specimen from Zanzibar.

*Type.* Female. B.M. no. 1. 5. 6. 4. Collected 14th February, 1901, and presented by S. L. Hinde, Esq.

The original series of *N. æthiopica*, from Kordofan, consists of three faded skins, with imperfect skulls; but fortunately, just as Mr. Hinde's specimen needed determination, the Museum has been presented by Messrs. N. C. Rothschild and A. F. R. Wollaston with a very nice set, both skins and spirit-specimens, from Shendy, on the Upper Nile, and these have enabled me to satisfy myself as to the constancy of the distinguishing characters of the new form.

As already indicated, the example from Zanzibar, referred to by Dobson (P. Z. S. 1879, p. 718), proves to belong, as might be expected, to *N. æ. luteola*.

### *Vespertilio platyops*, sp. n.

A large pale-coloured species, with the bicuspid incisors of *V. serotinus*, but with a broad blunt tragus.

Size rather less than in the Serotine. Head very flat. Ears of medium length, their inner margin strongly convex in its basal third, evenly slightly convex above to the rounded tip; outer margin slightly concave above, then convex to the notch, and ending in a low rounded lobe. Tragus broad, expanded above its broadest point at about the middle of its inner margin; inner margin straight, joining above at a rounded angle the strongly convex outer margin; a small triangular external basal lobule present.

Wings from the base of the toes. A small postcalcareaal lobule. Tail projecting from the membrane by the last vertebra.

Colour above (in spirit) uniform dull fawn or sandy; below dull whitish. Membranes brown, the plagiopatagium and interfemoral inconspicuously edged with whitish behind.

Skull very broad and flat; crests meeting posteriorly, but



not drawn out into a marked projecting angle, as in the Serotine.

Teeth very much as in the Serotine. Inner upper incisors bicuspid, outer minute. Lower incisors tricuspid, overlapping, their line more directly transverse and less angular than in the Serotine. Anterior lower molar slightly smaller in proportion to the second than in the allied species.

Dimensions of the type (in spirit):—

Forearm 46 millim.

Head and body 62; tail 39; hind foot (s. u.) 8.5; ear 16; tragus, length on inner edge 4, breadth 3; third finger, metacarpal 43, first phalanx 16, second phalanx 14; lower leg 20.5.

Skull: greatest length 19; basipalatal length 15; zygomatic breadth 14; breadth between orbits 8; constriction 4.3; palate, length 7.5; breadth across outer corners of  $m.^2$  8.5.

*Hab.* Lagos.

*Type.* Female in spirit. B.M. no. 88.5.17.3. Presented by the late Dr. G. E. Dobson.

The characters of this species are strongly confirmatory of the view that "*Eptesicus*" should not be separated from *Vespertilio*, for with the large size, heavy build, and more or less the crested skull of the former it has the broad tragus of the typical *Vespertilio*.

*V. megalurus*, the only other African species as large as *V. platyops*, has unicuspidate middle upper incisors.

*Vespertilio minutus somalicus*, subsp. n.

Closely allied to the typical *V. minutus*, Temm., but distinguished by smaller size, at least of head, and much paler coloration.

General characters as in *V. minutus*, the description of that animal in Dobson's Catalogue agreeing in all details except those referring to colour, though it may be also noticed that the inner margin of the ear, instead of being "slightly convex to the tip," is flat or even faintly concave for its middle third.

General colour of fur above dull buffy, the hairs blackish slate for two thirds of their length, with their tips buffy; beneath the bases are equally dark, the tips being dull whitish. Hairs of back rather more than 6 millim. long. Wing-membranes smoky brown, interfemoral membrane paler brown, both prominently edged with whitish, recalling the white edging of *Pipistrellus Kuhlii* on the same parts.

Skull very small and delicate, smaller than South-African

specimens, although the forearm measurement does not appear to be less. The head is therefore apparently rather smaller in proportion.

Dimensions of the type (measured in flesh):—

Forearm 31 millim.

Head and body 44; tail 35; ear 10.

Skull: greatest length 12·5; basipalatal length 9·6; zygomatic breadth 8; interorbital breadth 3·1; breadth of brain-case 6·7.

Dimensions of a spirit-specimen (♀):—

Forearm 30.

Head and body 42; tail 35; ear 11; tragus on inner edge 3·3; lower leg 13.

*Hab.* Somaliland. Type from Hargaisa, 3500 feet; other specimens from Berbera.

*Type.* B.M. no. 98. 6. 9. 1. Collected 14th November, 1897, and presented by R. McD. Hawker, Esq. Other specimens presented by E. Lort Phillips, Esq.

This subspecies may be readily distinguished from the typical form by its far paler colour and prominently white-edged wing-membranes.

*Pterygistes azureum*, sp. n.

Very similar to the other species, which scarcely differ among themselves except in size, but smaller than any of them.

General characters, so far as can be made out on the single specimen, as in *P. Leisleri*, to which this form was assigned by Drouet and Peters \*. But the size is markedly less, the general build is lighter, the ears appear to be rather broader and more rounded, while the tragus is slightly narrower and more pointed.

Colour, in a spirit-specimen, apparently of the usual dark brown characteristic of *Pterygistes*. Hairs of back about 6 millim. in length.

Skull, as compared with that of *P. Leisleri*, smaller and more delicate throughout, smooth, unridged, no sagittal and scarcely any lambdoid crests perceptible in an old male. Teeth practically identical throughout with those of *P. Leisleri*.

Dimensions of the type (an old male, in spirit):—

Forearm 37 millim.

Head and body 54; tail 42; ear 12; tragus, length on inner edge 3, breadth 2; third finger, metacarpus 36·5, first phalanx 15, second phalanx 10·5; fifth finger, metacarpal 31,

\* Cf. Godman, Nat. Hist. Azores, p. 17 (1870).

first phalanx 8, second phalanx 4·7; lower leg 17; hind foot (s. u.) 7·7.

Skull: greatest length 14·2; basipalatal length 11; zygomatic breadth 9·4; posterior breadth 9; breadth between orbits 6·4; constriction 4·4; length of palate 5; breadth between outer borders of  $m.^2$  6·2; front of canine to back of  $m.^3$  5·1.

*Hab.* St. Michael's, Azores.

*Type.* Male. B.M. no. 65. 10. 2. 1. Collected and presented by F. DuCane Godman, Esq. One specimen only.

The single specimen has all its claws, both of feet and thumb, worn down quite blunt. Whether this is accidental or due to the nature of its habitat remains to be seen.

From the gigantic *P. maximus* and *lasiopterus*, through *P. noctula*, *stenopterus*, and *Leisleri*, there is a regular gradation in size down to this small Azorean representative of the group, all of them differing from each other in little else but size and the correlated development of the cranial ridges.

I accept with some hesitation the generic separation of the *noctula* group from *Pipistrellus*, advocated by Gray, Jerdon, H. Allen, Miller, and Méhely, on the ground that not only is the general build of the body different, but that the wings even are different in shape, owing to the reduction in length of the fifth digit. At the same time it must be admitted that some of the Indian species of *Pipistrellus*, such as *P. ceylonicus*, *chrysothrix*, *mordax*, &c., approximate to a certain extent to *Pterygistes*, and render the distinction less marked than it appears to naturalists who have only compared with each other such extreme forms as *Pterygistes noctula* and *Pipistrellus pipistrellus*.

*Pipistrellus Kuhlii fuscatus*, subsp. n.

Similar in all essential respects, in size, proportions, shape of ears and tragus, and in dentition, to the true *P. Kuhlii*, but distinguished by its uniform dark colour. The body is dark smoky brown above and scarcely lighter below, and the ears and volar membranes are uniformly dark slaty grey, without trace of the white edging so characteristic of *P. Kuhlii*.

Dimensions of the type (an adult male in spirit):—

Forearm 35 millim.

Head and body 45; tail 34; ear 12·5; tragus on inner edge 4; third finger, metacarpal 32, first phalanx 12, second phalanx 10; lower leg 14·5.

*Hab.* Naivasha, British East Africa.

*Type.* Male. Collected 19th October, 1900, and presented by Sir H. H. Johnston.

VIII.—*The Rutelid Genus Adorodocia and a new Allied Form.* By GILBERT J. ARROW.

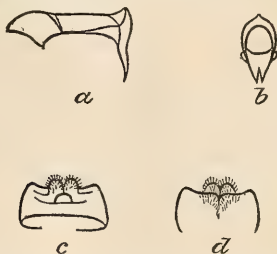
IN continuation of remarks recently made in this Magazine (May 1901) upon the genus *Adoretus* and some of its allies, I have a few observations to make upon the genus *Adorodocia* of Brenske ('Societas Entomologica,' 1893, p. 1), a chance examination of which has opened up questions of extreme interest and shown the genus to be in some respects the most remarkable in the family to which it belongs.

The genus was formed for a new species, *Adorodocia maxima*, the author including in it also *Adoretus latissimus*, Blanch., to which, from the description, he believed *A. strigatus*, Waterh., to be closely related, if not actually the same. Upon examination of the last species I find it to agree exactly, in spite of M. Fairmaire's positive statement to the contrary (Ann. Soc. Ent. Belg. 1896, p. 455), with the characters mentioned by Herr Brenske as distinguishing his genus, which, however, do not apply to the true *Adoretus latissimus* (evidently the *A. eunectoides*, Fairm.). It seems therefore that *A. strigatus* is the insect referred to by Herr Brenske under the name of *latissimus*. The thoracic marks, as he thought likely, have a tendency to disappear; but while those of *A. strigatus* consist of longitudinal stripes parallel to the margins, *A. latissimus* has a transverse row of spots. The latter species, although of extraordinary form, the elytra being produced laterally into a broad flange, is in its structural details a true *Adoretus*, while in *Adorodocia strigata*, on the contrary, external resemblance is the chief bond with that genus. In addition to the flattened prosternal process, the emarginate labium, and the cleft terminal segment of the abdomen, an important feature not observed by Herr Brenske is the possession of a conspicuous membranous fringe to the elytra, the absence of which, according to Lacordaire, is the distinguishing characteristic of the group Adoretides. Although the existence of a prosternal process seems to forbid its being assigned to any other group, it is impossible to refuse significance to this character, especially as it occurs in conjunction with so many other peculiar features. In fact, until a new system of classification is devised to replace that of Lacordaire, this genus also must be added to those which gather upon the uncertain borderlands, finding as yet no ordered resting-place.

The remarkable form of the last abdominal segment of this insect is characteristic of the male sex, the female showing only the slightest reminiscence of it. As might be supposed,



the male apparatus connected with this structure is exceedingly peculiar—indeed, so extraordinary that, but that the sex of the other form of the species is beyond doubt, it would have left the determination of the sexes still uncertain. The ventral and dorsal aspects of this apparatus are shown at *c* and *d* in the accompanying sketch.



The two sexual forms are easily distinguishable by their external appearance, the males being more depressed, with a larger head and less convex pronotum, the latter being more broadly margined laterally. Three specimens of each sex are contained in the British Museum.

Although Herr Brenske has not investigated the sexual characters of the type species, *Adorodocia maxima*, there can be no doubt that it is congeneric with and closely related to *A. strigata*; but whereas the sculpture of the latter is simply a coarse puncturation, the former is described as “aciculate” punctured.

Exceedingly like *Adorodocia strigata*, and for more than twenty years undistinguished from it in the British Museum collection, is an insect which upon careful examination has proved so different from it in its structural details that another genus has of necessity to be formed for it. The single specimen is a male, and the genitalia (shown by side and end view at *a* and *b*), although not greatly differing from those of Rutelidæ in general, are so entirely unlike those of the other insect as to suggest no affinity at all. Yet, although there are various other structural differences, the points of resemblance are so many that it is impossible to widely separate the two genera. Altogether the problems suggested by these strange Madagascan forms are of the utmost interest.

The following is the generic diagnosis of the new insect:—

PSEUDADORODOCIA, gen. nov.

Caput magnum. Clypeus semicircularis. Labrum triangularis, apice prolongato. Labium medio emarginatum. Antennæ 10-articulatæ, elongatæ, articulis tertio et sexto valde elongatis.

Processus prosternalis lamelliformis, postice parum productus. Mesosternum acuminatum, non productum. Ungues multo inæquales, pedum quatuor anteriorum majores ante apicem minutissime fissi, posticorum simplici. Pygidium integrum. Segmentum ultimum ventrale emarginatum, non fissum. Elytra distincte membranaceo-marginata.

It must not be forgotten that this diagnosis is drawn up from the male alone and that one or two of the characters cited will probably apply only to that sex. The mouth-parts are as in *Adorodocia*, but the clypeus is semicircular instead of pointed. The prosternal process has the same compressed form, but is not strongly produced backwards as in *Adorodocia*. The claws, again, in the two anterior pairs of legs are minutely cleft beyond the middle, whereas in the other genus both sexes have them equally divided at the tip. The membranous margin to the elytra is again present. Finally, the different form of the last abdominal segment is correlated to the entire difference in the genitalia already mentioned.

*Pseudadorodocia ænigma*, sp. n.

Supra omnino pallide testacea, prothorace vage himaculato, subdepressa, modice elongata, undique breviter albo-setosa; capite magno, oculis prominentibus, clypeo semicirculari, cum fronte (ab illo linea recta demarcata) grosse punctato; prothorace valde transverso, lateribus regulariter curvatis, angulis anticis paulo acutis, dorso grosse irregulariter punctato, utroque latere linea vaga fusca ornato; scutello lateribus punctato; elytris irregulariter et confluentur punctatis, punctis lineis longitudinalibus indistinctis formantibus lateribus fere parallelis; pygidio corporeque subtus rufis, illo cum pectore longius hirsuto; tibiis anticis bidentatis, dente tertio obsoleto.

Long. 16 mm.

*Hab.* Madagascar, Antananarivo.

The specimen was found by Mr. Kingdon and has been in the Museum since 1879. It deceptively resembles *Adorodocia strigata*, Waterh., but is rather smaller and narrower, in addition to which the semicircular clypeus affords the most apparent distinction. The description of *Adoretus maculicollis*, Fairm., applies very nearly to this insect, but the former is said to have dark marks upon the vertex, a narrow dark lateral margin to the elytra, and the under surface "vage cœrulescens," of none of which is there any indication in my type.

I have learnt just before the publication of this note that Mr. F. Bates has three specimens of this insect in his collection. Mr. Bates has kindly examined these for me, and finds

that, while two correspond with my type, the third (obviously the female), a rather darker specimen, differs in having the two claws of the foot more equal (a difference found also between the sexes of *Adorodocia strigata*), while the larger claw is very slightly and equally divided *at the tip*. The front claws are lost, but I think it may be assumed that in claw-structure the female *P. ænigma* is exactly similar to the female *A. strigata*.

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IX.—*New Species of Noctuidæ from Tropical America.*  
By W. SCHAUS, F.Z.S.

*Calydia norduca.*

Head and thorax yellowish buff, irrorated with brown scales. Abdomen pale brown. Primaries yellowish buff, irrorated on costa and base with black scales; inner line very oblique to subcostal vein, then slightly curved to inner margin, pale metallic blue, outwardly shaded with ochreous; inner margin tinged with lilacine; median line very oblique from costa to end of cell, then wavy to inner margin near angle, pale metallic blue and lilacine; an outer pale blue metallic line very obliquely curved to outer margin at vein 4, then following margin to angle, and inwardly shaded with ochreous brown; above vein 4 a marginal metallic line and the veins silvery; on costa the metallic lines are striated with black. Secondaries somewhat hyaline buff, shading to pale brown on outer margin; a marginal line from apex to vein 3, inwardly white, outwardly metallic; some black and silvery scales at vein 2, preceded by a lilacine spot.

Expanse 19 millim.

*Hab.* Jalapa, Mexico.

*Palindia merta.*

Palpi, head, and collar dark grey. Thorax fawn-colour. Abdomen brown, the subdorsal tufts fawn-colour. Primaries: a little less than basal half fawn-colour; whitish in the cell, except a large blackish-brown space on costal margin to submedian vein, and containing a small lighter brown spot at base of costa; traces of an inner line, dentate above median, twice curved below it; the curve on inner margin inwardly shaded with black scales; a velvety black median line shaded on either side with dark reddish brown, outwardly oblique

from costa to inner margin; outer portion of wing dark steel-grey, shading to brown on outer margin; a velvety black discocellular streak, outwardly shaded with reddish brown and surmounted by a dark shade to costa; traces of a dentate outer greenish line above vein 3, shaded with buff between 5 and 6; subterminal consisting of some irregular dull greenish shades; minute buff points at tips of veins; fringe dark greyish black. Secondaries brown; some terminal pale scales; fringe partly mottled with buff. Underneath dark greyish brown; the inner margin of primaries white; the inner area of secondaries shaded with white; some blackish and buff spots on costa of primaries and a dark outer line; secondaries with two darker transverse lines.

Expanse 24 millim.

*Hab.* Rio Janeiro.

*Dyomyx placida.*

Head and thorax umber-brown. Abdomen dull brown. Wings brown. Primaries: the basal line blackish, oblique to median vein; the inner line dark brown, slightly oblique to median vein, then wavy, slightly curved inwardly to inner margin; the median line dark brown, wavy to vein 2, then slightly oblique outwardly to inner margin, where it is preceded by the ocellus and followed by some silvery scales; the ocellus black, containing a white point and circled with light brown; the reniform faintly outlined with dark brown; the outer line angled between 6 and 7, not perceptible below vein 3; traces of a subterminal dark shade; marginal dark points between the veins; fringe dark grey, a pale line at base. Secondaries: a median and an outer darker line; beyond the anal angle three silvery spots, the centre one followed by a round velvety black spot edged with light brown. Underneath lighter brown; a darker, finely lunular outer line and a similar median line on secondaries; faint discal spots; four buff spots on costa of primaries before apex, both above and below.

Expanse 33 millim.

*Hab.* Orizaba, Mexico.

*Barydia tremula.*

Body light brown. Wings light brown, irrorated with darker brown; terminal white spots inwardly shaded with dark brown and connected by a faint wavy brown line; base of fringe paler. Primaries: a geminate inner transverse line, dark brown, somewhat lunular; an indistinct darker geminate fine median shade; reniform round, lilacine white; traces of



a fine geminate outer line; the subterminal dentate, partly geminate; the outer margin with fewer irrorations. Secondaries with two dark brown outer lines, somewhat lunular, parallel from above anal angle, and not reaching the costal margin, followed by some greyish scales. Underneath light brown; a blackish subterminal shade; discal spots outlined with dark brown, followed on primaries by a single indistinct line and on secondaries followed by three brownish lines.

Expanse 60 millim.

*Hab.* Aroa, Venezuela.

*Homoptera janisca.*

Body brown, the abdomen darkest, with the dorsal tufts very conspicuous. Wings brown, with darker mottlings and irrorated with a few black scales; the costa spotted with black; an inner transverse band, consisting of three indistinct lines; the median shade formed of indistinct darker lines; a dark brown patch at the end of the cell, followed beyond the cell by a large paler space reaching the costal margin; a dark space on costa before the apex; some fine wavy shades in place of the outer lines; the subterminal indistinct, lunular to vein 4, then curved inwardly to outer margin, most distinct below vein 4, and geminate below vein 3; a dark space on outer margin between veins 3 and 4; a wavy buff line on base of fringe, preceded by dark points between the veins close to margin. Secondaries brown, crossed by darker lines; the subterminal nearly black, outwardly shaded with buff towards anal angle and somewhat interrupted by the veins; base of fringe as on primaries. Underneath buff, irrorated with brown striæ; a dark spot between the veins on outer margin. In a specimen from Espiritu Santo the space beyond the cell on primaries and the outer margin of both wings is broadly shaded with lilacine grey, as in *H. marginale*, Walk.

Expanse 46 millim.

*Hab.* Rio Janeiro.

*Homoptera Dukinfieldia.*

Body brown. Wings brown, with blackish irrorations and striæ. Primaries: a basal, geminate, dark shade; the inner line curved, geminate, most heavily marked below the median vein, where it is shaded with velvety black; median shade consisting of three indistinct lines, shaded with black in cell, the orbicular paler, vague, flecked with a few white scales

above and below; the outer line dark, fine, heavily marked between veins 5 and 8, where it is preceded by a wavy velvety black line, and followed by two blackish spots between veins 6 and 8; the subterminal heavily marked from inner margin to vein 4, interrupted by the veins, and followed by a duller brown line; marginal dark spots between the veins; fringe dark, with the base paler. Secondaries with numerous striæ, forming broken lines; the outer line fine velvety black, wavy, followed closely by a fine dark brown line; the subterminal velvety brown, broken by the veins and not reaching the costa; marginal spots and fringe as on primaries.

Expanse 62 millim.

*Hab.* Castro, Parana.

*Homoptera divaricata.*

Palpi outwardly brown, inwardly fawn-colour. Collar light reddish brown. Thorax mottled light and dark brown, the patagiæ posteriorly blackish grey. Abdomen brown, the segments posteriorly dark grey. Primaries dark brown to beyond outer line; base of subcostal vein shaded above with buff; basal line geminate, buff, not reaching inner margin; inner line whitish buff, geminate, straight, except below submedian, where it is inwardly curved, and on costal margin the inner portion is also inwardly curved; this line is outwardly shaded by darker brown and is followed in cell by a small velvety spot, representing the orbicular; from origin of vein 2 a pale line curves up to vein 7, which it follows a short distance, then curves down to between veins 4 and 5, and then is slightly curved to inner margin, and followed closely below vein 3 by the outer line; between veins 3 and 7 the outer line is geminate, pale, filled in by a dark brown line, and forms two curves beyond the cell; a pale streak on vein 7 beyond the outer line and a broader pale dash from vein 7 to costal margin near apex; from inner margin to vein 7 the outer line is broadly shaded with dark brown to the subterminal, which is velvety blackish brown, toothed between veins 3 and 4, and almost obsolescent between 4 and 6; the outer margin is lilacine grey, darkest close to the subterminal, and becoming browner on extreme margin; a marginal row of dark lines between the veins, inwardly shaded with buff; a dark terminal line; base of fringe buff. Secondaries lighter brown, a dark line from base to outer line near the inner margin; outer line pale, finely shaded inwardly with dark brown; a subterminal wavy dark brown line; a dark marginal line, interrupted by veins and inwardly

shaded with buff; a terminal dark line. Underneath light brown, thickly irrorated with dark brown; a dark brown outer line, somewhat lunular; dark discal streak; an inner line on secondaries; a dark spot on costal margin of primaries at one third from base.

Expanse 57 millim.

*Hab.* San Paulo.

*Homoptera sabena.*

Body greyish black; the head, collar, and abdomen mottled with buff scales. Primaries brown and buff, with numerous indistinct transverse lines; the veins irrorated with greenish grey; costal, inner margin, and a broad outer band dark greenish; the outer band crossed by two irregular dentate black lines; a whitish discocellular line; black marginal spots outwardly shaded with buff; base of fringe buff. Secondaries with a median and outer band, the latter as on primaries. Underneath buff, irrorated with brown striæ; brown discal points; a dark outer line and on secondaries also a median line.

Expanse 43 millim.

*Hab.* Jalapa, Mexico.

*Matigramma stunia.*

Body and wings brown, irrorated with lilacine scales. Primaries: a slightly darker brown inner line; a similar outer line, curved beyond cell, broadly shaded outwardly with violaceous brown; an oblique darker brown shade from reniform to outer line on inner margin; reniform indistinct, large, darker brown; a subterminal shade, devoid of irrorations, except on the veins; outer margin light violaceous brown; a terminal lunular dark line. Secondaries similar; a black discal point; the outer line geminate; subterminal clusters of white scales between the veins. Underneath greyish brown, irrorated with lilacine scales; very faint traces of inner and outer lines.

Expanse 25 millim.

*Hab.* Jalapa, Mexico.

*Campometra mascara.*

Frons tinged with ochreous; vertex and abdomen brown. Thorax violaceous brown, very dark posteriorly and at base of abdomen; abdominal dorsal tufts reddish brown, tipped with black. Primaries: base dark violaceous black, crossed by an irregular velvety black inner line, and limited by a geminate median line, less heavily marked; outer portion of

wing reddish brown ; the veins and a broad shade following the outer line violaceous black ; the outer line fine, velvety black, irregular, excurved beyond cell, incurved below reniform ; reniform large, white, crossed by two brown shades ; costal margin beyond outer line black, with four buff spots ; subterminal wavy, velvety black between veins 6 and 8, otherwise dark reddish brown, followed by some blackish blotches ; a submarginal black line interrupted by the veins ; a terminal dark line ; fringe buff and grey, crossed by darker shades. Secondaries brown, the costa broadly paler ; a black streak from base near inner margin ; outer line fine, black, deeply dentate, not extending above vein 6 ; the subterminal dark red, shaded with brownish red, and followed near anal angle by a violaceous black shade ; veins on outer margin violaceous black ; a submarginal interrupted black line. Underneath : primaries buff, irrorated with brown and grey scales ; a dark inner and outer line, the former geminate on costa ; a brown discal spot, divided by a pale line ; base of fringe white. Secondaries buff, irrorated with brown ; an inner line, angled in cell at the large discal spot ; a finely wavy outer line ; a broad subterminal brown shade.

Expanse 46 millim.

*Hab.* Aroa, Venezuela.

*Campometra caminata.*

Palpi, head, and collar light brown, the latter with a dark transverse line anteriorly and posteriorly. Thorax light brown, with dark markings ; clusters of white scales on patagiæ. Primaries : an evenly curved broad buff and white inner band, outwardly finely edged with black ; a pale streak from base to inner line along and below median vein ; some brown and buff marks on costa ; basal space above inner margin dark brown ; median space to reniform light brown ; a geminate dark brown transverse median line, interrupted just below median vein, and suffusing on inner margin ; reniform large, white, oblique, bifurcating posteriorly, containing a black point anteriorly and a buff spot below it, and is also finely edged with black ; a black line from reniform to inner margin, slightly curved inwardly, so the median space between this line and inner line is much narrower below the cell than on the margins ; space to subterminal light brown, with dark brown patches between the veins and a deeply dentate outer black line from costa to vein 3 ; subterminal broad, buff, parallel to outer margin, inwardly edged with black, outwardly with brownish black, and followed by a narrow lilacine shade between veins 2 and 5 ; outer margin light brown, darker towards apex ; a submarginal black line,



interrupted by the veins; a fine terminal darker brown line. Secondaries light brown; a black and white discal spot; outer line finely dentate, black, followed by a light brown shade, and then dark brown to subterminal, which is as on primaries. Underneath buff; the outer margins shaded with brown; large brown discal points; a faint median dark line; a distinct outer line.

Expanse 52 millim.

*Hab.* Aroa, Venezuela.

*Campometra obscura.*

Head reddish brown. Thorax dark violaceous. Abdomen grey. Primaries dark violaceous brown; costa beyond inner line shaded with light brown; the reniform and a marginal space from above vein 4 to vein 6 buff; the inner angle shaded with light brown; basal and inner lines velvety black; median line geminate blackish brown; outer line irregular, fine, dentate, excurved beyond cell, incurved below cell, followed by a dark spot on costal margin; subterminal velvety black, outwardly shaded with buff, toothed between veins 3 and 4; a velvety black interrupted submarginal line on both wings. Secondaries brown, irrorated with reddish brown; a subterminal reddish-brown line, most noticeable at anal angle. Underneath greyish brown; darker median and outer lines; a subterminal shade; a pale spot on primaries above vein 4, and also some pale costal spots.

Expanse 40 millim.

*Hab.* Chiriqui.

PHIALTA, gen. nov.

Antennæ fasciculate; palpi long, porrect, second joint fringed below, third joint nearly as long as second. Head with slight tuft. Thorax tufted posteriorly. Abdomen with a single subdorsal tuft on first segment. Tibia hairy, fore femora with very large tufts of hairs, hind tibia with a single spine. Primaries crenulate, broad; vein 2 remote from 3, 6 from upper angle, 10 from before end of areole. Secondaries broad, slightly excised before vein 2; 5 from just above 4; the inner area heavily scaled above and below.

*Phialta duomita.*

Head and collar light reddish brown, irrorated with grey. Thorax greyish buff, the scales tipped with white. Abdomen brown. Primaries light greyish brown; the median space whitish, covered with long black striæ; inner line velvety black, geminate from costa to submedian vein, filled in with brown; the median space outwardly limited by a

brownish line, outwardly oblique from costa, inwardly curved below median and toothed above submedian; a black point as orbicular; reniform large, whitish, partly outlined with black; the outer line fine, velvety black, excurved beyond cell, incurved between vein 2 and submedian; a black streak between 6 and 7; a dentate terminal line and terminal black points at veins; fringe grey, with darker spots at veins. Secondaries brownish buff, the outer margin broadly dark grey. Underneath: primaries greyish, the inner margin broadly whitish; a dark outer line: secondaries whitish, tinged with yellow near inner margin; inner margin narrowly, outer margin broadly black; a black streak from base near inner margin.

Expanse 43 millim.

*Hab.* Aroa, Venezuela.

*Placonia demera.*

Head and thorax brown. Abdomen dark grey; a dark velvety transverse streak at base, followed by a whitish subdorsal patch; dorsal tufts brown. Primaries grey, irrorated with brown scales; the base slightly darker; a fine dark inner line, shaded with velvety brown inwardly on inner margin; orbicular indistinct, containing a white point; a geminate brown median shade from cell to inner margin; reniform grey, outwardly shaded with whitish, which continues on to costa, and followed by a dark brown shade; outer line finely dentate, preceded by a brown spot on costa, and broadly shaded with brown outwardly below vein 2; subterminal shade brownish, wide on costa, not extending below vein 3, and darker between veins 3 and 4 and 5 and 6; marginal brownish spots between the veins; a terminal brown shade; fringe grey, basally paler. Secondaries brownish, the outer margin shaded with grey; the outer lines fine, somewhat punctiform; the subterminal shade dark brown from anal angle, not reaching costa, and slightly wavy. Underneath dull grey; median and outer darker lines; a pale discal spot and some yellowish costal spots on primaries.

Expanse 43 millim.

*Hab.* Chiriqui.

Allied to *Placonia simplicior*, Walk.

*Placonia pascuala.*

Palpi dark brown. Head reddish brown. Thorax dark brown. Abdomen grey. Primaries brown, irrorated with reddish-brown scales; the basal space dark steel-grey, crossed by the basal and limited by the inner line, both of which are velvety black; a median geminate dark brown line, preceded

by a black orbicular point; reniform large, white, partly outlined with dark brown; the outer line fine, dentate, originating from a black costal spot; the subterminal blackish, very broad on costa, followed by a small black spot between veins 3 and 4. Secondaries darker brown; two white discal spots; the subterminal dark brown, chiefly towards anal angle; a submarginal interrupted dark line. Underneath dark silky grey; slightly darker inner and outer lines.

Expanse 41 millim.

*Hab.* Orizaba, Mexico.

*Safia minta.*

Body brown. Primaries brown, darkest at the base and along costa; inner line fine, velvety black, irregular, curved, nearer base on inner than on costal margin; a geminate dark median shade, slightly oblique inwardly from costal margin; reniform indistinct, pale brown, preceded by a pale streak edged with dark brown; outer line fine, black, dentate, inwardly curved to below orbicular, then finely dentate to inner margin; subterminal hardly visible except below costa, where it is dark and dentate; small dark marginal spots, inwardly shaded with buff; a darker brown terminal line; fringe brown, with a basal buff line. Secondaries brown; two dark indistinct median shades; outer line finely wavy, velvety black, followed by a blackish shade, containing some reddish scales towards inner margin, where it suffuses with the subterminal, which is velvety black, shaded with reddish brown, and nearly straight from anal angle to vein 7, except a slight tooth between veins 6 and 7; marginal spots and fringe as on primaries. Underneath brownish grey; a finely wavy dark outer line; marginal brownish spots shaded with white; a pale discal streak, edged with brown; fringe entirely greyish brown; on primaries some dark and pale costal marks; on secondaries the discal spot followed by a finely wavy dark line.

Expanse 33 millim.

*Hab.* Rio Janeiro; Aroa, Venezuela.

*Safia eminens.*

Body brown. Wings brown, mottled with buff scales and darker brown striæ; inner line fine, black, angular, partly shaded with buff, preceded by a black point in cell, and followed by the orbicular, which is small, round, black; a median wavy brown line; reniform indistinct, containing a black point resting on median vein, and edged outwardly by

an irregular whitish line; the outer line fine, black, wavy, dentate, shaded with pale buff on inner margin and towards costal margin, where it starts from a triangular greyish-brown spot, which is broadly edged with pale buff; the subterminal dentate, pale buff, interrupted by a dark velvety brown spot below vein 7, and by a smaller dark brown triangular spot between veins 3 and 4; marginal whitish spots outwardly shaded with black; a terminal dark line below vein 4. Secondaries: the lines indistinct; a velvety brown spot between veins 3 and 4 on subterminal. Underneath dull brown; traces of an outer and also an inner and median darker line on secondaries.

Expanse 44 millim.

*Hab.* Aroa, Venezuela.

*Safia bruma.*

Body dark brown; the abdominal segments shaded with dark grey posteriorly. Primaries dark brown; the basal third almost black, limited by a nearly straight velvety black line, outwardly shaded with lighter brown; two indistinct dark brown median lines; reniform indistinct, large, cut by a dark semilunar line, and containing some whitish scales; the outer line fine, lunular, dentate, preceded on costal margin by a large triangular blackish-brown spot; the subterminal indistinct, except below costa, irrorated with red scales; the outer margin blackish brown; marginal dark spots, inwardly shaded with paler brown; fringe mottled with roseate towards apex. Secondaries dark brown, the outer half shaded with reddish brown; a faint geminate outer line; the subterminal blackish, finely wavy; a pale line near margin, interrupted by the veins; a terminal black line; fringe partly grey, partly reddish brown. Underneath brown, thickly irrorated with darker striæ; on secondaries traces of inner, median, and subterminal darker shades.

Expanse 49 millim.

*Hab.* Orizaba, Mexico.

*Safia picturata.*

Head and collar ochreous brown. Thorax brown, shaded with dark steel-grey and lilacine, also the first segment of abdomen dorsally. Abdomen brown; two subdorsal blackish spots. Primaries: the base dark reddish brown, irrorated with lilacine scales, limited by a buff line; median space pale olivaceous brown, crossed by two darker wavy shades; outer line fine, brown, broadly shaded with lilacine, origi-



nating from a triangular olive-brown costal spot, containing some lilacine scales. A subterminal reddish-brown shade, outwardly dentate and shaded with lilacine; veins on outer margin irrorated with lilacine; submarginal dark spots; a terminal darker brown line. Secondaries olivaceous brown; a broad subterminal reddish-brown shade; the outer margin ochreous brown above vein 4, thickly irrorated with lilacine scales below vein 4. Underneath light brown, irrorated with dark brown; outer line finely lunular; a dark subterminal shade; inner line less marked; dark discocellular streak.

Expanse 40 millim.

*Hab.* Petropolis, Brazil.

*Yrias zora.*

Head light brown. Thorax brown, thickly mottled with violaceous hairs. Abdomen greyish brown. Primaries brown, thickly mottled with violaceous to the subterminal line; lines velvety black; the basal line outwardly shaded with buff on costa; the inner line wavy, inwardly shaded with buff, especially on costa; a geminate wavy median line; reniform buff, inwardly edged with black; the outer line irregular, not very distinct, inwardly projecting below discal spot, starting from a large costal spot, outwardly shaded with buff; the subterminal wavy, thickest at costa and partly shaded with buff; marginal black spots between the veins, inwardly shaded with buff, and connected to the dark terminal line by black streaks; base of fringe buff; some red scales scattered on costal margin and on the subterminal below costa. Secondaries brown, the outer half mottled with buff; the outer line curved down towards anal angle; the subterminal very distinct between veins 2 and 6, and outwardly shaded with a few red scales; the marginal spots not connected with the terminal line. Underneath light brown, the outer margins shaded with buff; a broad dark outer line; black discal points; on primaries some pale costal spots; on secondaries two dark spots between discal spot and inner margin.

Expanse 35 millim.

*Hab.* Orizaba, Mexico.

*Yrias barata.*

Body mottled dark and light brown. Primaries brown, mottled with buff on costal and median space; inner line fine, velvety black, nearest base on inner margin; a median, fine, dark brown shade; reniform large, white and buff, outwardly

and inwardly shaded with black scales; outer line fine, velvety black, angled twice beyond cell, inwardly curved below reniform, then dentate to inner margin; subterminal only visible between veins 6 and 8, and then only faintly, and replaced by some dark violaceous black shadings; marginal dark spots inwardly shaded with buff; a terminal dark brown line; fringe grey. Secondaries brown; two whitish spots in cell, followed by an indistinct geminate darker line; the outer line and subterminal parallel, the latter more heavily marked, velvety black, indistinct towards costa; marginal spots and terminal line as on primaries. Underneath dull buff, irrorated with brown, the secondaries paler; the subterminal shade distinct on both wings; the median shade more distinct on secondaries; a faint discal streak; outer margins greyer.

Expanse 40 millim.

*Hab.* Aroa, Venezuela.

*Yrias noctar.*

Body dark grey; the head brownish. Wings very dark brownish grey, thinly irrorated with white scales; traces of two inner and a black outer line, the latter curved below cell and most noticeable on inner margin; the reniform indistinct, containing a round white spot at origin of vein 3; the outer line followed by a row of short white streaks on the veins; the subterminal indistinct, shaded outwardly with light brown between the veins; terminal buff spots between the veins, preceded by dark streaks; fringe with a basal buff line; the dark brown terminating in paler spatulate scales. Secondaries with an outer row of white points on veins and an indistinct darker subterminal shade; a buff spot at anal angle; terminal spots as on primaries. Underneath, the wings are light brownish grey, with outer and subterminal dark shades and an inner line on secondaries.

Expanse 38 millim.

*Hab.* Paso de San Juan, Jalapa, Mexico.

*Yrias albidiscata.*

♀. Body dark brown, the head paler. Wings dark brown, mottled with violaceous black. Primaries: a dark basal and inner line, the latter starting from a dark costal spot and partly edged with lighter brown; a geminate dark wavy median shade; the reniform large, either entirely white or mottled brown and white, the brown predominating; the

outer line dentate, velvety black beyond the cell, otherwise indistinct; the subterminal fine, velvety black, slightly toothed between the veins from 3 to 7, and shaded with paler brown; marginal black spots inwardly shaded with buff; a wavy black terminal line; fringe dark brown, paler at base. Secondaries: the outer line indistinct; the subterminal finely dentate, wavy, velvety black; the marginal spots and fringe as on primaries; two small white spots in the cell. Underneath greyish brown, the outer margins greyer. Primaries: some pale costal spots on outer half; a buff discal spot; a curved dark outer shade. Secondaries: an outer and an inner dark shade; a dark subterminal shade and marginal brown spots on both wings.

Expanse 40 millim.

*Hab.* Paso de San Juan, Mexico.

My males of this species are not sufficiently good to describe.

*Yrias corvita.*

Body blackish; basal segment of abdomen with a white line. Wings dark brown, thickly irrorated with bluish and grey scales. Primaries: the inner line velvety black, irregularly curved, nearest base on inner margin, and contiguous to black orbicular spot; reniform long, grey, edged with black on either side, and followed by a white mark, forming a hook between veins 4 and 5; outer line velvety black, irregular, curved beyond cell, wavyly oblique to inner margin below vein 3, inwardly shaded with brown, outwardly with dark steel-grey and whitish transverse striæ about the veins; costal margin finely striated with white; subterminal pale, dentate, broadly shaded inwardly with light brown, which becomes very dark between veins 6 and 8, and outwardly shaded with dull violaceous brown; a terminal light brown band crossed by darker striæ, inwardly limited by a black line, outwardly by a brown line. Secondaries: the outer line straighter; the subterminal partly interrupted, in one specimen broadly shaded with white from inner margin to vein 6; inner line broad, black; fringe on both wings dark grey. Underneath brown; dark discal points; a faint dark outer line and subterminal shade; on secondaries traces of three other lines on inner margin; fringe below tinged with light steel-grey.

Expanse 28 millim.

*Hab.* Rinconada, Mexico.

*Yrias brunca*.

Head and abdomen brown, mottled with reddish-brown scales; dorsal tufts on abdomen black. Thorax brown shaded with violaceous. Primaries brown; a darker space at base; costal and subcostal veins streaked with black; the costal space mottled with red; an oblique median geminate darker line; the outer line fine, dentate, dark reddish brown; the reniform finely outlined with dark reddish brown; a subterminal reddish-brown shade, the most distinct of the markings; a fine terminal line and reddish-brown marginal spots. Secondaries with a reddish-brown discal spot; the subterminal as on primaries. Underneath dark silky grey, the fringe greenish yellow.

Expanse 38 millim.

*Hab.* Demerara.

[To be continued.]

X.—*The New Mexico Coccidæ of the Genus Ripersia.*

By T. D. A. COCKERELL.

IN the course of an investigation of the insects found in ants' nests my wife and I have met with a surprisingly large number of Coccidæ, almost all associated with *Lasius*. The ants' nests are under rocks, and the coccids feed upon the roots and underground stems of plants, mostly grasses. Some of the coccids appear to be only accidentally associated with the ants, as it were; but others, especially those of the genus *Ripersia*, are carefully collected and cared for, and removed to places of safety by the worker ants when the nests are disturbed.

These myrmecophilous Coccidæ are hardly to be found in the southern parts of the country, owing to the rarity or absence of *Lasius*. Professor W. M. Wheeler writes me that he has never met with any species of *Lasius* in Texas.

*Ripersia aurantia*, sp. n.

♀.—“*Bright orange*, with very little mealy powder; *very convex, almost hemispherical*. Long. 2 millim., lat.  $1\frac{1}{2}$ ” (*W. P. C.*). Legs and antennæ reddish brown. Antennæ 6-jointed, fifth joint cup-shaped; joints measuring as follows in  $\mu$ \*:—(1) 33, (2) 39, (3) 48, (4) 18, (5) 30, (6) 80.

\* All measurements of antennæ and legs in this paper are in  $\mu$ .



Formula 6 3 2 (1 5) 4. Anal ring with six bristles; caudal tubercles not at all produced, each bearing a bristle about the size of bristles of anal ring.

*Hab.* Las Vegas, N. M., April; rarely, with *Lasius americanus*.

I have seen an ant wildly rushing about with one in its jaws. By its convex shape, together with the orange colour, this species is very different from all the others. First found by Wilmatte P. Cockerell.

*Ripersia Cockerellæ*, King, ined.

*Hab.* Beulah, N. M., about 8000 feet, with *Lasius niger neoniger*, Emery.

Antennæ 7-jointed.

*Ripersia confusella*, sp. n.

♂.—Length of body 1300–1550  $\mu$ ; antennæ 660  $\mu$ ; wing 1150  $\mu$ ; cottony tails about 700  $\mu$ . Dull greyish brown to pale pink, antennæ and legs almost white; dorsum of thorax pale, with a yellowish tinge, no distinct vittæ; wings very white; mesosternum whitish; middle of abdomen pale. *Head seen from above large, triangular, broadest behind the eyes, which are small and dark crimson.* Males discovered by Wilmatte P. Cockerell, April 23.

♀.—Pale pink, varying to pale yellowish, without lateral tassels; small caudal tassels present. The young larvæ are pale yellowish; half-grown individuals which have just moulted appear bright pink. Adult (with eggs forming) about 2 millim. long; antennæ 6-jointed, formula 6 3 1 2 5 4; joints: (1) 33, (2) 30, (3) 45, (4) 21, (5) 27, (6) 60. Middle legs:—femur + trochanter 150; tibia 105; tarsus\* 66.

♀ (*penultimate stage*).—Antennal joints:—(1) 36, (2) 33, (3) 39, (4) 24, (5) 33, (6) 75. Middle legs:—femur + trochanter 132; tibia 65; tarsus 60. The antennæ and tarsus of this stage are about as in the adult, but the femur and tibia are shorter. The antennal measurements are variable to some extent, but on the whole remarkably constant in a considerable series.

*Egg*.—Pale ferruginous, oval; 650  $\mu$  long.

*Hab.* Las Vegas, N. M., about 6400 feet, very abundant, in nests of *Lasius americanus*; also at Trout Spring, Sapello Cañon, April 27.

The ants collect large piles of the eggs, from which we found the larvæ hatching in enormous numbers.

\* All measurements of the tarsus are without the claw.

This is an ordinary-looking form, with antennæ much as in *R. candidata*, King, ined., but it is of a different colour from that species and occupies a different region. It differs from *R. flaveola* by having the third joint always longer than the second, whereas in *flaveola* these antennal joints are equal in length. *R. Kingii* is a pink species with a superficial similarity to *confusella*, but the antennæ are decidedly different\*.

In *R. confusella* and *R. candidata* the fourth antennal joint is always decidedly the shortest; in *R. Kingii* it is no shorter than the fifth, or, at any rate, is not noticeably the shortest joint of the antenna. Prof. Tinsley gives the following formulæ for *Kingii*:—6 (1 2) 5 4 3; 6 3 1 (2 4 5); 6 3 (2 1) (5 4).

*Ripersia fimbriatula*, Ckll. & King, ined.

*Hab.* Las Vegas, in nests of *Lasius americanus*, often in the same nests as *R. confusella*. Also at Santa Fé.

Easily distinguished by its small size (about 1170  $\mu$  long), uniform yellow colour, and fringe of cottony tassels all round the body. Antennæ 6-jointed.

*Ripersia flaveola*, Ckll.

*Hab.* Las Vegas, N. M.; originally described from Massachusetts.

The following particulars refer to specimens taken at Las Vegas with *Lasius interjectus*, April 30, 1901:—

♀.—Length a little over  $1\frac{1}{2}$  millim.; light orange, thickly covered with white meal; caudal lobes quite prominent; bristles of anal ring 39  $\mu$ ; middle legs with tibia 102, tarsus 72; antennal segments:—(1) 36–39, (2) 42, (3) 42–45, (4) 36, (5) 30–33, (6) 33–36, (7) 75–84. This accords well with Mr. King's measurements of Massachusetts specimens. The antennal formulæ of Las Vegas specimens are 7 3 2 1 4 (5 6) and 7 (2 3) (1 4 6) 5. Prof. Tinsley has found the formulæ 7 2 (4 3) (1 6) 5 and 7 2 5 1 (6 3) 4 in Massachusetts material.

*Ripersia Porteræ*, sp. n.

♀.—Globose, very pale pinkish or sometimes yellowish: mounted specimen  $2\frac{2}{5}$  millim. long and  $2\frac{1}{3}$  broad; enclosed in a snow-white sac just like that of *Dactylopius lichtensioides*.

\* In making these and other comparisons I have been greatly assisted by data kindly furnished by Messrs. Tinsley and King.

Labium not elongated; hairs of anal ring remarkably short; legs ordinary, middle leg with femur + trochanter 135, tibia 70, tarsus 60. Antennæ 6-jointed: (1) 35-39, (2) 39, (3) 42-45, (4) 24-27, (5) 33-36, (6) 60-66.

*Hab.* Las Vegas, on roots of grass, April 25 (*Wilmatte P. Cockerell*).

A very distinct species, with its pale colour and snow-white sac.

*Ripersia salmonacea*, sp. n.

♀.—Length about 1700  $\mu$ . Plump, of ordinary form, pale salmon-pink, appearing white above from a dense mealy secretion, which leaves the segments well marked; not so mealy below, hence pinker. *Margin with an irregular but distinct fringe of cottony tassels*, almost or quite obsolete in the thoracic region; short caudal tassels. Legs and antennæ extremely pale.

Boiled in liquor potassæ turns a fine deep claret-colour; labium dimerous, long. 120, lat. 90  $\mu$ ; anal ring with six bristles; skin with many small glands, not hairy; legs large, only sparsely hairy, about four hairs in each longitudinal row on tibia; femur stout.

Middle leg: femur + trochanter 200; tibia 126; tarsus 84. Width of femur about 67.

Antennæ 7-jointed, formula 7 (1 2) (6 3 4 5). Joints: (1) 42, (2) 42, (3) 30, (4) 30, (5) 30, (6) 35, (7) 78-84. Joint 7 has a notch about 35  $\mu$  from base; joint 6 is cylindrical, not cup-shaped.

*Penultimate stage*.—Tarsus about 80, tibia 80.

*Very young*.—Salmon-pink, not mealy.

*Hab.* Near Gallinas River, at La Cueva, prox. 5800 feet, April 20 (*Wilmatte P. Cockerell*).

Easily recognized by its colour and fringe.

*Ripersia tenuipes*, sp. n.

♀.—Length 2 millim. Very light pinkish, looking almost white; no lateral or caudal tassels; not a hairy species; eyes well developed; labium about 90  $\mu$  long and 60 broad; antennæ and legs, especially the latter, unusually slender; middle legs with femur + trochanter 156 (femur 35 broad); tibia 108; tarsus 62. Antennæ 7-jointed, but the suture between 3 and 4 obscure. Joints: (1) 30, (2) 24, (3) 24, (4) 24-25, (5) 21-23, (6) 24, (7) 60-69.

*Hab.* Trout Springs, Gallinas Cañon, April 27 (*T. D. A. & W. P. Cockerell*).

Quite distinct by the rather large size, pale colour, and slender legs.

*Ripersia trichura*, sp. n.

♀.—Longer than usual, pinkish, but covered with white mealy secretion (*W. P. C.*).

Skin unusually crowded with round glands; cephalic region somewhat bristly; caudal region very bristly; caudal lobes not prominent, their bristles about  $165\ \mu$  long; six bristles on anal ring,  $135\ \mu$  long; legs not unusually slender; anterior femur  $105\ \mu$ ; middle leg with femur + trochanter  $138$  (femur alone  $105$ , width  $36$ ); tibia  $84$ ; tarsus  $57$ .

Antennæ 6-jointed. Joints: (1) 39–45, (2) 33–36, (3) 30–42, (4) 25–27, (5) 30, (6) 60. Formulæ 6 1 2 (3 5) 4 and 6 1 3 2 5 4.

*Hab.* Las Vegas, April 29 (*Wilmatte P. Cockerell*).

My wife brought this in with the remark that it seemed to be new; but I thought it was *confusella*, until I saw the extraordinarily long bristles of the anal ring and caudal tubercles. The caudal bristles of *confusella* measure about  $117\ \mu$ , of *trivittata*  $114\ \mu$ . The bristles of the anal ring in most of the species are under  $100\ \mu$ —for instance,  $72$  in *Porteræ*,  $45$  in *trivittata*. The legs of *R. trichura* are similar to those of *confusella*.

*Ripersia trivittata*, sp. n.

♂.—Body  $950$ – $1050\ \mu$  long; antennæ about  $600$ , 10-jointed, joints cylindrical, with whorls of hairs; wings  $1100\ \mu$ ; two white caudal filaments, short, about  $150\ \mu$ . General colour, including legs and antennæ, light straw-yellow; head, prothorax, extreme base of antennæ, and abdomen suffused with lilac; mesothorax with three purplish-brown longitudinal stripes; sides of thorax purplish brown; eyes black, relatively large, prominent, shiny; head seen from above widest in region of eyes.

♀.—About  $1\frac{1}{2}$  millim. long; of ordinary form. Pale yellowish, with a slight pink tinge, some decidedly pink; sparsely mealy; turning dark brownish red on boiling in liquor potassæ.

Antennæ and legs pale brown; antennæ 6-jointed, (1) 30, (2) 30, (3) 30, (4) 18–24, (5) 24, (6) 72. Formula 6(1 2 3) 5 4. Anterior tibia about 60; tarsus 63.

*Hab.* Las Vegas, under a rock with *Lasius americanus*, April 18; males and females together in numbers, apparently copulating.

The female is known from *confusella* by the first three antennal joints being of about equal length; but I should have thought it only a variety but for the essentially different male.



*Ripersia viridula*, sp. n.

♀.—Length  $1\frac{1}{2}$  millim.; form ordinary. Pale sage-green, legs and antennæ reddish brown; dorsum rather thickly covered with mealy secretion; no lateral tassels, two extremely short but thick caudal tassels; not a hairy species; middle leg with femur + trochanter 150 (width of femur 45); tibia 90; tarsus 60. Antennæ 7-jointed, 6 cup-shaped, 7 narrow. Joints: (1) 36, (2) 33, (3) 30, (4) 30, (5) 18, (6) 27, (7) 60. Formula 7 1 2 (3 4) 6 5.

*Penultimate stage*.—Labium about 120 long, 70 broad; middle legs with femur + trochanter 117; tibia 66; tarsus 60. Antennæ 6-jointed. Joints: (1) 27–30, (2) 27–30, (3) 30–33, (4) 15–21, (5) 18–21, (6) 51–54. Last joint stout. Formulæ 6 (1 2 3) (4 5), 6 3 (1 2) 5 4, 6 (1 2 3) 5 4.

*Hab.* Las Vegas, under rocks with *Lasius americanus*, abundant, April 19.

Easily known by its pale green colour, which is quite uniform.

East Las Vegas, New Mexico, U.S.A.,  
May 9, 1901.

## POSTSCRIPT.

*Ripersia magna*, W. P. & T. D. A. Cockerell, sp. n.

♀.—About  $2\frac{3}{8}$  millim. long. *Dark pink*, darker and pinker than *R. confusella*, sparsely mealy, no caudal or lateral tufts; legs and antennæ pale brown; on boiling in liquor potassæ turns wine-red, but does not stain the liquid.

Middle leg with femur + trochanter 204  $\mu$ ; tibia 111; tarsus 76.

Antennæ 7-jointed; measurements of joints in  $\mu$ :—(1) 39, (2) 42, (3) 27, (4) 24–30, (5) 21, (6) 27–30, (7) 63–66. 6-jointed phase:—(1) 42, (2) 39, (3) 51, (4) 18, (5) 24, (6) 60. Formulæ 7 2 1 6 (3 4) 5 and 6 3 1 2 5 4.

*Hab.* Trout Spring, Gallinas Cañon, N. M., April 27 (W. P. & T. D. A. Cockerell).

This was omitted from the original paper, because both Mr. King and I thought it might be conspecific with *R. Cockerellæ*. My wife all along maintained that it was distinct, and on May 11 collected further material of *R. Cockerellæ* at Beulah, which fully confirms her opinion. *R. Cockerellæ* when boiled in potash turns yellow-orange and then brownish; when alive it varies from yellow to pinkish and is never the deep pink colour of *R. magna*. It appears to be the New

Mexico representative of *R. Lasii*, to which *R. magna* is not nearly related. The following measurements in  $\mu$  are from the new lot of *R. Cockerellæ*:—

Middle leg: femur + trochanter 174; tibia 129; tarsus 63.

Antennæ: (1) 30, (2) 30, (3) 18, (4) 33, (5) 21, (6) 27, (7) 63. 6-jointed phase: (1) ?, (2) 30, (3) 42, (4) 21, (5) 28, (6) 66.

I take this opportunity to describe the following species of the allied genus *Phenacoccus*:—

*Phenacoccus Wilmattæ*, sp. n.

♀.—Brownish olivaceous; without lateral tassels; no ovisac observed; surface sparsely mealy; length when mounted  $2\frac{1}{2}$  millim.; body pinkish after boiling in potash; legs and antennæ pale brown; legs very sparsely hairy; middle leg with femur + trochanter  $213\mu$  (width of femur 87), tibia 150, tarsus 89; claw with a small denticle on inner side near tip; hind tibia 180 long, 42 broad; hind tarsus 75 long, 21 broad; body not hairy; bristles of anal ring about  $90\mu$  long; caudal lobes not at all produced; rostral loop short, not nearly reaching to middle legs; second joint of antennæ conspicuously broader than third, and always longer.

Antennæ: 9-jointed phase, formula 2 9 3 1 5 (4 6 7 8); segments, (1) 39, (2) 54, (3) 45, (4) 30, (5) 36, (6) 30, (7) 30, (8) 30, (9) 48. 8-jointed phase: formula 8 2 (1 3) (5 7) (4 6); segments, (1) 42, (2) 54–60, (3) 42, (4) 27, (5) 30–33, (6) 27, (7) 30–33, (8) 81–87.

*Hab.* Beulah, N. M., 8000 feet, on *Viola* aff. *pedatifida*, May 11 (*Wilmattæ* P. Cockerell).

Allied to *P. americanæ*. Easily known by the remarkably thick hind tibia, which is much broader than its tarsus. The four other legs are quite ordinary.

XI.—On a Collection of Butterflies made by George Migeod, Esq., in Northern Nigeria between September 1899 and January 1900. By ARTHUR G. BUTLER, Ph.D.

THE collection of which this is an account is chiefly interesting owing to the strong North-eastern character of the species, tending to confirm the evidence in favour of a complete connexion between Western and Eastern types above the Equator. It was obtained at Yelva Lake, Borgu.

Species new to the Museum and others poorly represented in our cabinets are in this collection, also a remarkable series of *Charaxes epijasius* which we had previously received from Senegal, Abyssinia, and the White Nile; both wet and dry phases of *Precis antilope* occur.

Five examples of *Zeritis amine* are in the collection; with regard to this species, which Prof. Aurivillius assumes to be the *Z. neriene* of Boisduval, one must note what the Professor himself says:—"In Boisduval's figure of *Zeritis neriene* the neuration, as usually in the figures of this author, is quite incorrectly figured, and the hind wings drawn from an example in which the tails were broken off." To this note may be added that the *Z. neriene* of Boisduval is not described, the upper surface of the wings is not figured, the under surface (if intended to represent what I described as *Z. amine*) is quite incorrect in pattern, the anal lobe is omitted, and, lastly, the locality is uncertain, though Boisduval thought it might be Guinea. In short, we have no evidence whatever that Boisduval's insect was intended for "*Z. amine*," beyond a general similarity in the pattern of the under surface. His insect may have been generically distinct, the upper surface may have been entirely dissimilar, the locality may have been anywhere in the Ethiopian Region. Without evidence no species should be sunk into the rank of a synonym, nor should an acknowledged utterly incorrect and partial illustration of an undescribed insect be ranked as of any scientific value; if proved to be fictitious, it should be treated exactly in the same way as Petiver's figure of *Papilio ecclipsis*, and ignored.

Two other Lycenidæ of interest were obtained—*Catochrysops cyclopterus* and *Chilades alberta*; the first an Abyssinian form, the second an insect occurring in Equatorial Africa. In the Pierinæ the Eastern *Teracolus opalescens* occurs, whereas I should have expected that either *T. maimuna* or *T. eris* would have been the representative form of Northern Nigeria. However, to anyone with an eye for form and pattern it is impossible to mistake one insect for the other, the outline of the white area in the primaries of the males being most characteristic: the apical spots, however, are rather characteristic of the Western than the Eastern form; and if this peculiarity of Nigerian examples should prove to be constant, it might become necessary to regard them as representing another subspecies of the *T. eris* group.

Two males of *Caprona adelica* were obtained, corresponding in all respects with Karsch's figure of the female; it therefore seems probable that M. Mabille confounded two species under

this *Stethotrixa heterogyna*, and that *C. adelica* is really distinct from *C. pilaana*, or it may be that *C. pilaana* is the wet phase of the species and *C. adelica* the dry. A male of what I take to be *Kedestes? lentiginosa*, Holland, has the transparent brand on the secondaries and general character of *Parosmodes Morantii*; I think it belongs to that genus. Two Hesperiidæ are new to science.

The following is a list of the species:—

Melanitis solandra, <i>Fabr.</i>	Argiolaus menas, <i>Druce.</i>
Monotrichtis safitza, <i>Hew.</i>	— calisto, var., <i>Hew.</i>
— milyas, <i>Hew.</i>	Zeritis amine, <i>Butl.</i>
Charaxes epijasius, <i>Reiche.</i>	Syntarucus telicanus, <i>Lang.</i>
— achaemenes, <i>Feld.</i>	Azanus moriqua, <i>Wlgr.</i>
— Kirkii, <i>Butl.</i>	Catochrysops cyclopterus, <i>Butl.</i>
— varanes, <i>Cram.</i>	Chilades alberta, <i>Butl.</i>
Precis boopis, <i>Trim.</i>	— trochilus, <i>Freyer.</i>
— clelia, <i>Cram.</i>	Neolycaena cissus, <i>Godt.</i>
— amestris, <i>Drury.</i>	Mylothris chloris, <i>Fabr.</i>
— antilope, <i>Feisth.</i>	Teracolus opalescens, <i>Butl.</i>
Catacroptera cloanthæ, <i>Cram.</i>	Catopsilia florella, <i>Fabr.</i>
Neptis agatha, <i>Cram.</i>	Sarangesa synestalmenus, var., <i>Karsch.</i>
Hypolimnas misippus, <i>Linn.</i>	Abantis nigeriana, sp. n.
Hamanumida dædalus, <i>Fabr.</i>	Caprona adelica, <i>Karsch.</i>
Lachnocnema bibulus, <i>Fabr.</i>	Pyrgus machacosa, <i>Butl.</i>
Axiocerses amanga, <i>Westw.</i>	Parosmodes lentiginosa, ♂, <i>Holl.</i>
Pilodeudoryx cærulea, <i>Druce.</i>	Kedestes protensa, sp. n.
Virachola livia, <i>Klug.</i>	
Hypolycaena philippus, <i>Fabr.</i>	

### Descriptions of the new Species.

#### *Abantis nigeriana*, sp. n.

Allied to *A. zambeziaca*, *A. paradisea*, and *A. plerotica*: primaries smoky brown, veins darker; hyaline white spots as in *A. plerotica*, also a white dash below the extremity of the costal vein between the first and second subcostal branches, a white spot near the base of the cell, and two white dots at the base of the wing: secondaries creamy whitish, with the base, veins, and outer border, including the fringe, dark brown, the pattern being nearly as in *A. paradisea*: thorax spotted much as in *A. paradisea*, but the patagia very long, each with a white spot below the collar, a central white spot, and a deep orange tip; tufts at sides and extremity of thorax tawny orange; abdomen smoky grey at base and tip, silvery white in centre, with blackish dorsal stripe; anal tuft blackish at base, otherwise bright golden-orange; antennæ black, with the club creamy white below. Wings below with pattern as above, but the internal three fourths of primaries white,



interrupted externally by the interno-median fold and sub-median vein, which are brown : secondaries snow-white ; the costal and outer borders much blacker than above, the radial and median veins only blackish as they approach the border : pectus and palpi ochreous ; venter white, with a dusky lateral line, which changes to pale ochreous on the posterior segments ; sides ashy ; anal tuft orange.

Expanse of wings 40-43 millim.

Three examples, 24th to 26th September, 1899.

*Abantis plerotica* was sent to us by Mr. Marshall from Mashonaland as *A. venosa*, together with the typical form. I suspect it is the wet phase of that species.

*Kedestes protensa*, sp. n.

Allied to *K. tucusa* of Trimen, but considerably larger, the costal margin of the primaries and abdominal margin of the secondaries much longer : secondaries above without discal markings and sometimes without the hairy white or buffish spot at the end of the cell : on the under surface the colouring is richer, the costal and apical areas of the primaries, with the submarginal spots, being buff shading into orange ; the secondaries buffish stone-colour alternated with orange somewhat as in *K. mohozutza* ; the black spots of the discal series on the secondaries do not form a regular **W**, as in *K. tucusa*, but run almost parallel to the submarginal series ; there is also a tapering submedian dusky streak from the outer margin to the base.

Expanse of wings 35 millim.

22nd, 24th, and 26th September, 1899.

XII.—On a few Undescribed *Rhynchota*.

By W. L. DISTANT.

Fam. **Pentatomidæ**.

Subfam. *SCUTELLERINÆ*.

*Hyperoncus uniformis*, sp. n.

Above ochraceous ; thickly, finely, and darkly punctate, sparingly covered with very minute black spots ; sternum and legs ochraceous, coarsely darkly punctate ; abdomen brownish ochraceous, with a broad, central, ill-defined fascia, the stigmatal spots and lineate macular lateral margins ochraceous : the abdomen is also coarsely punctate, much less so

on central area ; rostrum ochraceous, its apical joint brownish ; antennæ with the first and second joints ochraceous, their apices brownish ; third and fourth joints brownish, their bases ochraceous.

Long. 11 millim. ; exp. pronot. angl. 9 millim.

*Hab.* Ceylon (*E. E. Green*).

*Pævilicoris Crowleyi*, sp. n.

Head black, anterior lateral areas metallic green. Pronotum purplish red ; a small transverse spot near each anterior angle, a spot near each lateral angle, and two large spots at base, occupying more than half of the whole area and very narrowly divided, black ; anterior margin, margins of the basal spots, and the sublateral areas metallic green. Scutellum purplish red, with eleven black spots—three small on basal margin, two near base, two subapical, and four central, which are united in pairs ; basal margin and margin of spots metallic green, disk with a violaceous tinge. Head beneath ochraceous, its base and two spots near apex metallic green ; sternum metallic green, outer area of prosternum purplish, posterior margins of the sternal segments ochraceous, areas of the odoriferous apertures black ; abdomen beneath reddish ochraceous, with a marginal series of wide ray-like fasciæ almost reaching centre, and the greater part of the apical segment brassy green. Legs brassy green, antennæ and rostrum black. Rostrum reaching the fifth abdominal segment.

Long. 20 millim. ; exp. pronot. angl.  $11\frac{1}{2}$  millim.

*Hab.* Assam (Crowley Bequest, Brit. Mus.).

A species which may be placed near *P. Childreni*, White.

Subfam. *ASOPINÆ*.

*Mecosoma thoracata*, sp. n.

Head testaceous, coarsely punctate, eyes fuscous ; pronotum ochraceous, coarsely punctate, a sublateral fascia on each side connected with a broader submarginal anterior fascia, black ; a large bronzy-brown transverse patch, convex anteriorly, situate a little in front of posterior margin, and a little broader than the base of the scutellum ; scutellum black, with a broad lateral fascia on each side and the apex ochraceous ; a black foveate spot in each basal angle ; corium black, with a broad ochraceous apical fascia ; connexivum ochraceous, membrane bronzy. Body beneath pale greyish ; posterior angles of prosternum, lateral margins of meso- and metasterna, and anterior segmental margins ochraceous ; head

beneath, trochanters, femora, anterior areas of pro-, meso-, and metasterna, and apical abdominal segment testaceous; tibiæ and tarsi black; apical abdominal segment with two ochraceous apical spots. Antennæ mutilated; scutellum sparingly and coarsely punctate, depressed from behind base, and with a very distinct central carination on posterior half; corium thickly and finely punctate.

Long. 15 millim.; exp. pronot. angl. 7 millim.

*Hab.* Mashonaland, Salisbury (*G. A. K. Marshall*).

Subfam. *ACANTHOSOMINÆ*.

Genus *GALGACUS*.

*Galgacus*, Dist. Ann. & Mag. Nat. Hist. (7) vol. iv. p. 435 (1899).

*Galgacus macer*, Walk. (*Dictyotus*) Cat. Het. i. p. 182. n. 14 (1867); Dist. loc. cit.

In revising Walker's species I was (*supra*) compelled to found a new genus for the reception of the species he had described as a *Dictyotus*. The tarsi, however, in the unique type were not available for examination, so that its position was necessarily uncertain. I have since received a specimen for identification from Dr. Montandon, which proves the tarsi to be two-jointed, and thus locate *Galgacus* in the *Acanthosominæ*.

XIII.—*Descriptions of Brazilian Coccidæ*.

By ADOLPH HEMPEL, S. Paulo, Brazil.

[Continued from p. 561.]

*Ceroplastes lucidus*, Hempel.

Adult female scale subglobose; wax brittle, thin, semi-transparent, reddish brown to yellowish brown. Dorsal nucleus prominent; lateral nuclei inconspicuous; the wax is depressed about the nuclei, making the surface rough and nodose. Divisions of the plates indistinct or obsolete. In the younger specimens the wax is amber-coloured and the surface more nodose; in the older specimens the surface becomes more even. Length 4.75 millim.; width 4.50 millim.; height 3.75 millim. Denuded of wax it is light brown, with five small humps, two on each side and one on the anterior end. Dorsum convex; derm shiny, hard; caudal

horn very small and dark brown. On the abdominal margin there is a small five-lobed flange. Anal cleft short, scarcely 1 millim. long. Boiled in a solution of KOH it colours the liquid reddish brown.

Antennæ variable, of six joints, all of which bear hairs. Length ·198–·230 millim. Length of joints: (1) 31, (2) 26–31, (3) 75–89, (4) 18–22, (5) 22, (6) 26–35. Approximate formula: 3 6 (1 2) 5 4 or 3 (6 1 2) (5 4). Legs short. Length of joints of first pair of legs: coxa 79, femur with trochanter 114, tibia 75, tarsus 53, claw 18, digitules of claw 26. Digitules of claw large, with widely expanded ends; tarsal digitules long and slender, with expanded ends. Rostrum well developed, placed just behind the insertion of the first pair of legs. Each stigmatal area is characterized by thirty to thirty-six cone-shaped spines and as many large round spinnerets. Around the lateral margin of the body there are a few short hairs. Many small glands are scattered over the dorsal and ventral derm.

Male scale white, very small, elliptical, with a slight dorsal keel. Length 1·25 millim.; width ·50 millim.

*Hab.* Ypiranga. Most abundant on *Baccharis dracunculifolia*, but also occurs on other plants of this genus.

*Ceroplastes purpureus*, Hempel.

Adult female scale thin, small, light brown, divided into seven distinct plates. The general outline is that of a rectangle with the sides nearly perpendicular. In the younger specimens the plates are distinct and are separated from each other by dark brown lines; in the older specimens the dorsum becomes more convex, the plates become indistinct, and the colour changes to purple. Dorsal nucleus present, white, slightly elevated; lateral nuclei indicated by slight depressions. Wax very thin and dry, but tough. Length 2·75 millim.; width 2·10 millim.; height 2·1 millim. Denuded of wax derm hard, shining, dark red, roughened by many small gland-pits. Caudal horn very small, dark brown. Boiled in a solution of KOH it colours the liquid dark red. The derm is chitinized and becomes light brown in colour.

Antennæ of six joints, all of which bear hairs. Length ·178–·206 millim. Length of joints: (1) 22–26, (2) 22–26, (3) 70–79, (4) 18–22, (5) 18–22, (6) 28–31. Approximate formula: 3 6 (1 2) (4 5). Legs short. Length of joints of first pair of legs: coxa 53, femur and trochanter 102, tibia 66, tarsus 48, claw 13, digitules of claw 26. Coxa with a short spine on the proximal end. Tarsal digitules long, of unequal



size, with expanded ends; digitules of claw, one large the other smaller, both with widely expanded ends. Rostrum well developed, usually placed about midway between the first and second pair of legs. Rostral loop extending beyond the second pair of legs. Each stigmatal area is characterized by twenty to twenty-five conical spines and as many spinnerets. Around the lateral margin of the body there is a simple row of short hairs set close together. Derm with a number of small glands.

*Hab.* Ypiranga. On the twigs of *Miconia* sp. and other bushes.

*Ceroplastes formosus*, Hempel.

Female scale rectangular; dorsum convex; wax bright lemon-yellow in colour, uneven, divided into seven distinct plates, situated two on each side, one on dorsum, one on the anterior end, and one on the posterior end. Dorsal nucleus large, white, usually covered with a black fungus; lateral nuclei not visible. The wax is lighter in the centre of lateral plates than on the edges, is hard and tough, and deeply depressed about the dorsal nucleus. Length 4 millim.; width 3 millim.; height 2.75 millim. Boiled in a solution of KOH the derm becomes transparent and soft. Caudal horn 500 millim. long, dark brown in colour.

Antennæ variable, of six joints, all of which bear hairs. Length .202-.224 millim. Length of joints: (1) 31-35, (2) 26, (3) 70-79, (4) 18-22, (5) 22, (6) 35-40. Approximate formula: 3 6 1 2 (4 5) or 3 (6 1) 2 (4 5). Legs short. Length of joints of first pair of legs: coxa 75, trochanter and femur 93, tibia 75, tarsus 66, claw 18, digitules of claw 31. Tarsal digitules 44. Digitules of claw of unequal size, one large and wide, with expanded end, the other smaller and narrower. Tarsal digitules very long and slender, with expanded ends. Coxa with two short spines on the proximal end; the tarsus frequently has an incision on the margin, giving it the appearance of being jointed. Rostrum between the first pair of legs; rostral loop extends to the third pair of legs. Anal ring apparently with six hairs. Each stigmatal area is characterized by about twenty conical spines and a few round spinnerets. The conical spines are situated on the entire margin of the body, except in the cephalic and caudal regions. The derm bears numerous small spinnerets.

*Hab.* Poços de Caldas, State of Minas Geraes. On twigs of *Eugenia* sp.

*Ceroplastes rarus*, Hempel.

Adult female scale oval; dorsum very convex, conical, coming to a point; wax thin, dry, brittle, creamy white, divided into seven distinct plates—two lateral on each side, one dorsal, one on the anterior end, and one on the posterior end. Nuclei large, conspicuous, dark brown, oval; posterior plate with two nuclei. The plates are divided from each other by areas of brown wax. The wax in the plates is arranged in concentric layers, those on the dorsum round, those on the sides square. Numerous fine lines also radiate from the nuclei. Length 5.75 millim.; width 4.50 millim.; height 4 millim. Denuded of wax derm hard, shiny, smooth, light brown, with eight small humps, situated two on each side, one on the anterior end, one on the dorsum, and one on each side of the caudal horn. Caudal horn small, short, dark brown, placed horizontally. Length 5 millim.; width 4 millim.; height 3.50 millim. Boiled in a solution of KOH it colours the liquid light yellow. The dorsal derm remains chitinized and opaque.

Antennæ of seven joints, all but joint 3 bearing hairs. Length .350–.391 millim. Length of joints: (1) 53–66, (2) 44, (3) 48–57, (4) 97–106, (5) 33–35, (6) 31–35, (7) 44–48. Approximate formula: 4 1 3 7 2 (5 6) or 4 (1 3) (7 2) (5 6). Legs ordinary. Length of joints of the first pair of legs: coxa 133, femur and trochanter 191, tibia 123, tarsus 97, claw 22, digitules of claw 36. Tarsal digitules very long and slender, with the ends widely expanded. Digitules of claw of equal size, large, wide, with widely expanded round ends. Rostrum placed nearer the second pair of legs than the first. Rostral loop short, not extending to the second pair of legs.

*Hab.* Ypiranga. On the twigs of an indigenous shrub.

*Ceroplastes cultus*, Hempel.

Adult female scale irregularly oval, truncated posteriorly; dorsum convex, smooth, shiny, creamy white, divided into seven plates by bright brown lines. The wax is thin and hard, and slightly depressed about each nucleus. Dorsal nucleus oblong, large, the lateral and terminal nuclei small, subcircular; all the nuclei are bright brown, with a small patch of white wax in the centre. The caudal plate has two nuclei. The dorsal plate is the largest and subcircular in outline. Fine lines radiate from all the nuclei and a few concentric rings are also present. Around the lateral margin the wax is thicker and nearly white. Length 5 millim.;

width 4 millim.; height 3·6 millim. Denuded of wax derm hard, brown; caudal horn black, small. There are three small tubercles on each side and one on the anterior end. Length 4 millim.; width 3 millim.; height 2·5 millim. Boiled in a solution of KOH the derm remains hard and opaque.

Antennæ variable, of seven joints, all except joint 3 bearing hairs. Length 272–307 millim. Length of joints: (1) 44, (2) 35–44, (3) 40–48, (4) 66–79, (5) 26–31, (6) 26, (7) 35. Approximate formula: 4 (3 1 2) 7 (5 6). Legs long. Length of joints of first pair of legs: coxa 128, femur and trochanter 168, tibia 133, tarsus 84, claw 26, digitules of claw 44. Tarsal digitules very long, slender, with expanded ends. Digitules of claw of equal size, large, with widely expanded ends. Rostrum situated about midway between the first and second pair of legs; rostral loop short, scarcely longer than the rostrum and mentum. Each stigmatal area is characterized by about thirty conical spines and as many large round spinnerets. Around the lateral margin there is a simple row of short hairs, each tuberculate at the base. The dorsal derm is composed of polygonal plates and contains many small glands. The ventral derm also bears some glands near the margin.

Male scale small, elongate, flat, with seven tufts of white waxy secretion around the margin and one elongate tuft on the dorsum. The posterior end also bears a few threads of white secretion. Length 1·50 millim.; width ·75 millim.

*Hab.* Ypiranga. On the stem of the plant *Erigeron canadensis*, L.

#### *Ceroplastes cuneatus*, Hempel.

Adult female scale irregularly oval in outline, truncated posteriorly, convex, wax coming to a blunt point on the dorsum, divided into seven indistinct plates. Colour creamy white, with light brown lines between the plates. Caudal plate with two nuclei. All the nuclei deep brown, with a bit of white secretion in the centre. The wax is much depressed about the nuclei and thickened around the margin. A deep sulcus runs around the dorsal plate, thus giving the surface a rough nodular appearance. Frequently a hood of wax is formed from behind over the dorsal nucleus, often partly covering it. Length 4·25 millim.; width 3·75 millim.; height 3·25 millim. Denuded of wax the derm is brown, shiny, hard. The lateral humps are faintly indicated, but not distinct. Length 3·25 millim.; width 2·50 millim.; height 2·00 millim. Caudal horn very small, brown.

Antennæ variable, of seven joints, all but joint 3 bearing hairs. Length ·312–·364 millim. Length of joints: (1) 44–53, (2) 35–44, (3) 48–57, (4) 84–101, (5) 26, (6) 31–35, (7) 44–48. Approximate formula: 4 3 1 (7 2) 6 5 or 4 (3 1 7) 2 6 5. Legs long. Coxa with two short spines on the proximal end. Length of joints of the first pair of legs: coxa 106, trochanter and femur 194, tibia 120, tarsus 97, claw 20, digitules of claw 35. Tarsal digitules very long, with expanded ends. Digitules of claw of equal size, large, with widely expanded ends. Rostrum situated between the first pair of legs. Rostral loop extending to the second pair of legs. Anal ring apparently with six hairs. Each stigmatal area is characterized by about thirty conical spines and by forty to fifty round spinnerets. Around the lateral margin there is a simple row of long hairs, each one tuberculate at the base. The derm is homogeneous and contains numerous small glands.

*Hab.* Ypiranga. On the stems of *Erigeron canadensis*, L.

*Ceroplastes formicarius*, Hempel.

Adult female scale oval to subcircular in shape, small, convex, irregularly nodose, wax divided into seven plates; with a slightly thickened border around the lateral margin. Caudal plate largest, with two nuclei. All the nuclei light brown in colour, sometimes with a faint trace of white secretion. Wax soft and moist, pinkish white in colour, depressed about the nuclei, giving the nodose appearance. Length 4 millim.; width 3·25 millim.; height 2·10 millim. Denuded of wax shiny; derm chitinized, but not very hard, light brown in colour, with a slight dorsal tubercle. Caudal horn small, a little darker than the derm. Length 3·5 millim.; width 2·5 millim.; height 1·75 millim.

Antennæ variable, of seven joints, all except joint 3 bearing hairs. Length ·327–·389 millim. Length of joints: (1) 53, (2) 53–66, (3) 62–75, (4) 70–89, (5) 28–35, (6) 26–31, (7) 35–40. Approximate formula: 4 3 2 1 7 (5 6). Legs long; coxa with several short spines. Length of joints of first pair of legs: coxa 102, trochanter and femur 204, tibia 146, tarsus 93, claw 28, digitules of claw 41. Tarsal digitules long, with expanded ends. Digitules of claw large, with widely expanded ends. Rostrum situated between the first pair of legs; rostral loop extending to the third pair of legs. Anal ring with six hairs. Each stigmatal area is characterized by a horseshoe-shaped depression on the ventral surface and by about twenty conical spines and thirty to thirty-five large round spinnerets. The lateral margin bears



a double row of conical spines, thickly set, especially on the sides. On the anterior margin the row of spines becomes simple and also bears a few long hairs. On the posterior margin there are few spines, but more long hairs. There is also a row of short hairs on the ventral surface, just inside the row of spines. The derm bears many minute glands.

*Hab.* Ypiranga. On the bark of *Maytenus* sp.

This species is accompanied by a large ant, *Camponotus* sp., that constructs a covering of grass or earth around the twigs upon which the insects are massed. A small lepidopterous larva also preys upon it, and appears to be very destructive.

*Ceroplastes rotundus*, Hempel.

Adult female scale oval in outline; dorsum convex, rounded. Wax smooth, thin, hard and brittle, divided into seven distinct plates, light buff in colour, with brown lines between the plates. Caudal plate with two nuclei. Dorsal nucleus oval, large, the others small and nearly square, all dark brown in colour, with a small patch of white secretion in the centre. All the plates have minute radiating lines from the nuclei and concentric rings, giving them the appearance of fish-scales. Length 5 millim.; width 4 millim.; height 3.50 millim. Denuded of wax the insect is brown, derm chitinated, caudal horn small, not darker than the derm; no apparent humps are present.

Antennæ variable, of seven joints, all except joint 3 bearing hairs. Length .330-.348 millim. Length of joints: (1) 44, (2) 44, (3) 53-57, (4) 89-97, (5) 29-31, (6) 31, (7) 40-44. Approximate formula: 4 3 (1 2 7) (6 5). Legs ordinary. Length of joints of first pair of legs: coxa 97, trochanter and femur 178, tibia 114, tarsus 97, claw 20, digitules of claw 35. Tarsal digitules very long and slender, with expanded tips. Digitules of claw large, with widely expanded tips. Anal ring apparently with six hairs. Rostrum situated between the first and second pair of legs; rostral loop short, extending beyond the second pair of legs. Each stigmatal area is characterized by about twenty-five conical spines and a few round spinnerets. The lateral margin bears a few tuberculate hairs. The derm bears many small glands.

*Hab.* Ypiranga, State of S. Paulo. On twigs of *Maytenus*.

*Ceroplastes simplex*, Hempel.

Adult female scale oval, convex, slightly depressed around the dorsal nucleus; greyish white in colour. The dorsal nucleus alone is visible, and is small, elliptical, and pure

white. Wax not shiny, slightly roughened by radial furrows and depressions, not brittle and not divided into plates, but is slightly thickened around the lateral margin. Length 4.50 millim.; width 3 millim.; height 2.60 millim. Denuded of wax the derm is hard, shiny, light brown in colour, with minute spots of darker brown. There are two slight humps on each side and one on the dorsum. Caudal horn sharp, short, scarcely .500 millim. long, dark brown in colour. Length 3.50 millim.; width 2.25 millim.; height 2 millim. Boiled in a solution of KOH it colours the liquid pink and makes it turbid. The derm remains hard and semitransparent.

Antennæ variable, of seven joints, all except joint 3 bearing hairs. Length .273-.307 millim. Length of joints: (1) 44, (2) 44, (3) 44-48, (4) 66-79, (5) 22-31, (6) 22-26, (7) 31-35. Approximate formula: 4 3 (1 2) 7 (5 6) or 4 (3 1 2) 7 (5 6). Legs ordinary. Length of joints of first pair of legs: coxa 79, trochanter and femur 182, tibia 123, tarsus 79, claw 22, digitules of claw 35. Tarsal digitules long and slender, with expanded ends. Digitules of claw large, with widely expanded ends. Rostrum large, situated just behind the first pair of legs; rostral loop extending a little beyond the second pair of legs. Each stigmatal area is characterized by about thirty blunt conical spines and the same number of large round spinnerets. The lateral margin bears a simple row of hairs set widely apart. The derm bears many minute glands.

*Hab.* Ypiranga, State of S. Paulo. On the twigs of a plant of the order Myrtaceæ. Collected by Dr. H. v. Ihering.

#### Genus TECTOPULVINARIA, Hempel.

Adult female secreting an ovisac like in *Pulvinaria*. Dorsum entirely covered with a white felt-like secretion. Antennæ of eight joints.

Type *Tectopulvinaria albata*, Hempel.

#### *Tectopulvinaria albata*, Hempel.

Adult female oval; dorsum convex, entirely covered with a white felt-like secretion, which is evidently in two parts, the first around the margin, the second covering the dorsum; this latter portion has the appearance of being secreted in concentric layers. Over the secretion on the dorsum there is usually a thin transparent scale, through which the dark brown dorsal nucleus can be seen. Frequently the secretion is elevated around the edges of the scale, leaving the middle of the dorsum depressed. In the older specimens the scale

usually drops off. Margin of body depressed. Anal plates dark brown, exposed. When removed from the bark it leaves a thick ring of white secretion behind.

Denuded of wax it is oval in outline, being widest posteriorly, of a deep orange colour, with antennæ and legs brown. The lateral margin is depressed, forming a flange; dorsum convex, with a median longitudinal ridge and four or five transverse furrows. Anal cleft about .50 millim. long. Length 3.75 millim.; width 3 millim.; height 1.25 millim. Ovisac short, convex, yellowish, transversely striated, 3 millim. long and 3 millim. high. Boiled in a solution of KOH it colours the liquid an orange colour with a pink tinge. The derm becomes soft and colourless.

Antennæ variable, of seven or eight joints, eight being the typical number. All joints bear hairs. Length .476-.564 millim. Length of joints: (1) 79-89, (2) 57-70, (3) 93-111, (4) 57-66, (5) 53-66, (6) 35-48, (7) 40-44, (8) 62-70. Approximate formula: 3 1 (2 8 4 5) 6 7. Legs large; tarsus curved. Length of joints of first pair of legs: coxa 178, trochanter and femur 400, tibia 289, tarsus 173, claw 62, digitules of claw 75. Tarsal digitules slender, short, with slightly expanded ends, not extending beyond the tip of claw. Digitules of claw narrow, with ends slightly expanded. Rostrum small, situated just behind the insertion of the first pair of legs. Rostral loop extending to the second pair of legs. Anal plates triangular, the antero-lateral side shorter than the postero-lateral. Anal ring with six hairs. Around the lateral margin of the body there are several (three or four) confused rows of long sharp hairs. The ventral surface bears many round spinnerets and some smaller glands, while the dorsal surface bears numerous small oval glands.

Male scale thin, white, narrow, elliptical; dorsum and ventrum slightly convex; usually covered with a thin white secretion. Length 1.75 millim.; width 1 millim.

Adult male orange in colour, oval, widest across the thorax. Antennæ of ten joints, all bearing many hairs, joint 10 having in addition three long knobbed hairs. Length of joints: (1) 62, (2) 70, (3) 102, (4) 155, (5) 218, (6) 178, (7) 173, (8) 133, (9) 89, (10) 120. Legs long and hairy. Genital spike narrow, .480 millim. long. The last segment of the body bears three long hairs on each side of the genital spike; the other segments bear four to six shorter hairs on each side. Halteres wanting. Length of body, excluding genital spike, 1.450 millim.; width .730 millim.

*Larva* (just hatched).—Oval, orange-yellow in colour. The

abdomen ends in two large plates, each bearing one long terminal seta and several shorter hairs. Around the lateral margin of the body there is a simple row of long hairs. Antennæ of six joints, joint 3 the longest. Legs short; claw long, with the digitules slender and slightly knobbed. Tarsal digitules very long and slender, with the ends slightly expanded. Rostral loop very long, being coiled in a circle on the abdomen.

*Hab.* Ypiranga and Jundiahy, on the stems of *Vernonia polyanthus*, Less., and *Trichogonia salviaefolia*. Usually accompanied by a species of *Cremastogaster*.

### Genus PROTOPULVINARIA, Ckll.

#### *Protopulvinaria convexa*, Hempel.

Adult female elliptical or oval; dorsum convex. A white ovisac is secreted below the insect, elevating the caudal end 2 millim., but leaving the cephalic end attached to the bark. Dorsum hard and shiny, usually covered with a thin white powdery secretion; this is sometimes only present in patches, sometimes it covers the entire animal. There is a slight median longitudinal ridge, and on each side two longitudinal rows of shallow gland-pits. The sides are slightly wrinkled. Colour above brownish red, usually with a median stripe of dark brown; below orange-red. Length 5.10 millim.; width 4.50 millim.; height 2 millim. Boiled in a solution of KOH it colours the liquid light brown. The derm remains chitinized and opaque.

Antennæ variable, of seven or eight joints. Antennæ of seven joints .381-.405 millim. long. All joints except joint 3 bear hairs. Length of joints: (1) 62, (2) 53, (3) 70, (4) 106-123, (5) 35, (6) 24-31, (7) 31. Approximate formula: 4 3 1 2 5 (6 7). Antennæ of eight joints .435-.467 millim. long. All joints except joints 3 and 4 bear hairs. Length of joints: (1) 66-75, (2) 66, (3) 79-84, (4) 48-53, (5) 79-84, (6) 35, (7) 31-35, (8) 31-35. Approximate formula: (3 5) 1 2 4 (6 7 8). Legs small. Length of joints of first pair of legs: coxa 84, femur and trochanter 191, tibia 151, tarsus 75, claw 24, digitules of claw 42. Claw very fine and slender; digitules of claw fine, with slightly expanded ends; tarsal digitules long, slender, with slightly expanded ends. Rostrum large, situated between the first pair of legs; rostral loop very short. Anal plates small, triangular, the two outer sides equal in length. Anal ring with six hairs. Around the margin of the body there is a double row of long sharp hairs. The derm on the ventral surface bears numerous long



filamentous glands, and on the dorsal surface there are several longitudinal rows of small round glands.

*Larva* (just hatched).—Elliptical, flat, reddish brown in colour; eyes large, conical, dark brown. Antennæ long, of six joints; joints 3 and 6 the longest and about equal in length. The body ends in two plates, each bearing one long terminal seta and several shorter hairs. The margin of the body is serrated and bears a simple row of rather long hairs. Legs long, slender, the digitules of claw and tarsus long and thin, with slightly expanded ends. Rostral loop not extending to the anal plates.

*Hab.* São Paulo. On the stems of *Smilax* sp.

Some small parasitic Diptera were bred from the ovisacs of this species.

[To be continued.]

## BIBLIOGRAPHICAL NOTICES.

*Studies in Fossil Botany.* By DUKINFIELD HENRY SCOTT, M.A., Ph.D., F.R.S., F.L.S., F.G.S., Honorary Keeper of the Jodrell Laboratory, Royal Gardens, Kew. Containing 151 Illustrations. London: Adam and Charles Black, 1900. Pp. xiii, 533.

THE author is a distinguished member of the energetic band of workers in palæobotany whose labours have in recent years contributed to throw so much light on many obscure points of the vanished flora of geologic times. Dr. Scott was associated with the closing portion of the long scientific career of the late Professor Williamson, and is well acquainted with the collection brought together by that veteran palæobotanist; therefore it is not surprising that much of the information here presented has been drawn from specimens contained in that collection, now national property, in the Natural History Museum, Cromwell Road.

The volume is founded on a course of lectures given four years ago at University College, Gower Street, under the same title, but entirely recast in accordance with newer information which has been rendered accessible since these lectures were delivered. It is confined to setting out the results of inquiries of chief importance from a botanical standpoint relating to the two subkingdoms of Pteridophytes and Gymnosperms, all considerations of the lower cryptogams and the phanerogams being put aside.

The author explains the difference in the condition of plants preserved by incrustation and petrification—the former being most familiar to those people who visit geological collections, while the second is largely confined to the cabinets of specialists as admitting

of the application of the operations of slicing and polishing. While the plants preserved by incrustation display such characters as the shape of the leaf and venation excellently, the organic structure has practically disappeared, those petrified, on the other hand, showing their minute anatomy to a surprising degree. The details of cell-structure can be made out with considerable certainty, and by painstaking collation of many specimens the entire histology may be determined.

Dr. Scott's plan is to go methodically through the alliances as follows, describing any special structure which may be found in them:—Beginning with the Equisetales, once so grandly developed in the Carboniferous period, though now only represented in the living series by one genus, then taking up the Sphenophyllales, representative of a type of vegetation which has wholly vanished, passing to the Lycopodiales, familiar to recent botanists in the genera *Lycopodium* and *Selaginella*, which are of humble dimensions when compared with their ancestral forms, and then the ferns, which are better represented in the present day than in the foregoing groups. Next in order we have the Cycadofilices, that curiously intermediate group between the Ferns and Cycads, which is only known in a fossil state, coming lastly to the Mesozoic Gymnosperms.

The object of the author is to compare the structure found in these fossil forms with similar structure found in recent plants. Quoting with approval Solms-Laubach's phrase that our object in studying the fossil forms is "the completion of the natural system," Dr. Scott is careful not to bring up any very doubtful specimens, but to keep attention fixed on those specimens which can throw light on the problems presented by these fragmentary remains. It would be impossible, we think, to read this volume with care and fail to gain a very good idea of the organization and the relations of these plants, not only to one another, but also to the existing vegetation. There is one special difficulty which besets the palæobotanist, and that is that fossil genera and species have been founded upon entirely different considerations from those which govern the naming of recent plants, and this, too, from the very nature of things, as a moment's reflection will show. Owing to the state in which these fossils occur, the root, the stem, and the fruit of the same plant have sometimes received generic rank only to be reduced as the result of examination of a large series or from some lucky accident showing the organic connexion of one of these structures to another. It is not surprising, therefore, that palæobotany teems with so-called genera and species which the systematist of recent plants would regard as hopelessly bad, and that much of the work and much of the interest of the present-day palæontologist is devoted to determining the relations of these separated parts.

The numerous drawings, reproduced by various processes, succeed in showing the points desired, mainly in consequence of the care spent in selecting the given specimen to bring out the special

character. We have mentioned that the plants here investigated are those whose internal structure has been preserved, either silicified or calcified; and thus it arises that the methods of anatomic observation are well adapted to the prosecution of this branch of research.

Where praise is due in no unstinted measure it may seem ungracious to note a small blemish; but the question suggests itself, Why should the author continue to write *Lyginodendron Oldhamium* with a capital letter? The form *Oldhamium* is due to earlier writers (instead of the more correct form *oldhamense*); but we find other instances, such as *Cheirostrobos Pettycurensis*, when the same author has correctly written *Medullosa anglica*. These trifling departures from the common usage of botanists do not, of course, really detract from the usefulness of the book, which, regarded from every point of view, is worthy of the author and of his subject.

*First Records of British Flowering Plants.* Compiled by WILLIAM A. CLARKE. Second Edition, Revised and Corrected. London: West, Newman, & Co., 1900. Pp. xvi, 194.

THE first draft of this volume appeared in the 'Journal of Botany' for 1892-96, and it was republished as a separate work in 1897, with additions and corrections and a note on nomenclature. But this edition did not satisfy the author, who has again revised the work, added the actual names used by the old authors cited, and has brought it out in a form which is a great improvement on the last edition.

The work being thus well known to the majority of British botanists, it hardly needs detailed description; but we may cordially welcome its reappearance in its new shape.

## MISCELLANEOUS.

*On the Dates of Publication of the 'Histoire naturelle générale et particulière des Mollusques terrestres et fluviatiles,' and the 'Tableaux systématiques des Animaux mollusques,' by the Barons Férussac and G. P. Deshayes.* By C. DAVIES SHERBORN, F.Z.S. &c., and B. B. WOODWARD, F.L.S. &c.

THE exact dates of publication of the parts of these remarkable twin works have long been a source of difficulty for malacologists, and though we have not been able to completely solve the problem, we think that enough information has been brought together to justify publication of the results attained.

The two works were issued together in 42 livr., which appeared between 1819 and 1851, while some portions of the text appear to have been issued in early livraisons of the companion work by the younger Férussac and Alcide d'Orbigny—the 'Hist. nat. . . . des

Céphalopodes' \* (see Instructions to Binder in this last work). This fact, coupled with irregular mode of issue and the difficulty of ascertaining the exact contents of the several parts, has made the unravelling a task of much trouble, while to this moment we find it impossible to understand the sheeting as cited in the 'Bibliographie de la France.'

The following is the list of the livraisons, with such details concerning their contents as could be found:—

Livr. 1. 1819. 3 sheets, pp. i-xvi, 1-	Bibl. Franç. 6 Mar. 1819.	{ 1-6 contained tom. ii. pt. 1, pp. i-xvi, 1-96 ("Fin de l'Hist. Nat. des Limaces"), Ann. gén. Sci. Phys. iii. 1820, p. 323, & iv. 319; Journ. Phys. 1819, p. 378; also in 'Isis,' 1822, Litt. Anz. 116. The "Historique des Limaces" and "Historique des Limaçons" are reprinted in 'Isis,' 1822, Litt. Anz. 153 & 169.
2. 1819. 2	5 June, 1819.	
3. 1819. 5	10 July, 1819.	
4. 1819. 2	18 Sept. 1819.	
5. 1819. 3	4 Dec. 1819.	
	[Sept. 1819 (Journ. Phys., Oct. 1819, Annonces).]	{ Contained the greater part of the text of the "Tabl. syst. Fam. Limaçons." Journ. Phys., Apr. 1821, Annonces.
6. 1820. 1	[Cover only.] 26 Feb. 1820.	
7. 1820. 8	17 June, 1820.	
8. 1820. $\frac{1}{2}$	5 Aug. 1820.	
9. 1821. 6	6 Apr. 1821 (dated 1820).	
10. 1821. 3	26 Mar. 1821 (dated 1820).	{ (In 1822, p. 338, 'Isis' noticed livr. 1-13, 1819-21; 72 pls. & 36 sheets text = tom. ii. pt. 1, to p. 100; pp. 1-94 of "Tabl. Fam. Limaçons" are also noticed: see note to livr. 28.)
11. 1821. 2 $\frac{1}{2}$	13 July, 1821.	
12. 1821. 2	21 Sept. 1821.	
13. 1821. 3	10 Nov. 1821.	
	(In 1822, p. 338, 'Isis' noticed livr. 1-13, 1819-21; 72 pls. & 36 sheets text = tom. ii. pt. 1, to p. 100; pp. 1-94 of "Tabl. Fam. Limaçons" are also noticed: see note to livr. 28.)	
14. 1822. 3	16 Feb. 1822.	{ (Livr. 14 & 15 contained "Tabl. Syst." i. pp. xlviii. Oken got livr. 15 later, for he speaks of it as just received ('Isis,' 1824, Lit. Anz. 1), and adds he has up to Lief. 20.)
	(Livr. 14 & 15 contained "Tabl. Syst." i. pp. xlviii. Oken got livr. 15 later, for he speaks of it as just received ('Isis,' 1824, Lit. Anz. 1), and adds he has up to Lief. 20.)	
15. 1822. 4	[Contained <i>inter alia</i> plate of Mélanopsides fossiles, no. 1, Mém. Soc. Hist. Nat. Paris, i. (1823) p. 149.] 13 Apr. 1822.	
16. 1822. 3 $\frac{1}{2}$	16 July, 1822.	
17. 1823. 1	[No text.] 2 Nov. 1823.	
	"Explic. des planches suppl. et de celles qui ne doivent pas faire partie du 1 <sup>er</sup> vol." "Point de texte," Fér. Bull. gén. 1823, ii. p. 65.	{ (No text.) Bibl. Franç. 1 Mar. 1823.
18. 1823.	[No text.] Bibl. Franç. 1 Mar. 1823.	
19. 1823.	"Nouvelle division Pulmonés" and "Suppl. à l'hist. nat. Limaces" = tom. ii. pt. 1, pp. 96 <sup>a</sup> to 96 <sup>z</sup> and 96 <sup>a</sup> to 96 <sup>h</sup> . See Férussac, Bull. i. (1824) p. 196.	
20. 1823.	[Contained <i>inter alia</i> plate of "Mélanopsides fossiles," no. 2; Mém. Soc. Hist. Nat. Paris, i. (1823) p. 149.] Bibl. Franç. 27 Sept. 1823 [19-21, 4 $\frac{1}{2}$ sheets.]	
21. 1823.	[Contained <i>inter alia</i> plate of "Mélanopsides fossiles," no. 2; Mém. Soc. Hist. Nat. Paris, i. (1823) p. 149.] Bibl. Franç. 27 Sept. 1823 [19-21, 4 $\frac{1}{2}$ sheets.]	

\* Of the dates of publication of this work all that can at present be said is that the first three out of the 21 livraisons appeared in Sept. 1834, nos. 4-9 in 1835, no. 12 in 1839, nos. 13-18 in 1840 taking the work up to p. 240, and that it was finished in 1848.



- Livr. 22. 1832. }  
 23. 1832. }  
 24. 1832. } [No text.]  
 25. 1832. }  
 26. 1832. }  
 27. 1832. [No text.] Bibl. Franç. 4 Aug. 1832. [22-27,  $\frac{1}{2}$  sheet & 36 pls.]  
 28. 1832. [? No text] last part by Férussac. Ann. & Mag. Nat. Hist. v. 1832, p. 192.  
 Moquin-Tandon also notices "livr. 1-28=pp. 1-128, 1819-32."  
 29. 1839. [Tom. ii. pt. 1, text up to p. 152.] (See Pfeiffer, Zeitschr. f. Malac. vii. 1850, p. 146, & ix. 1852, p. 116.) Undertaken by Deshayes on death of Férussac in 1836.  
 30. 1839. (Pfeiffer, Zeitschr. f. Malac. vii. 1850, p. 145.) Commenced with "Pulmonés sans opercule," *Helix polygyrata*, pp. 1-40.  
 31. 1840. (Pfeiffer, *ibid.* and p. 147, which seems to show that this livr. was "plates only.")  
 32. 1840. Plates only. (Pfeiffer, *ibid.*)  
 33. 1840 or 41. Plates only. (Pfeiffer, *ibid.*)  
 34. 1841. Plates only. (Pfeiffer, *ibid.* and p. 153.) Work suspended by Deshayes's voyage to Algeria.  
 35. Feb. 1850. (Pfeiffer, *ibid.*). (9 sheets=pp. 4-?; Bibl. Franç. 16 Feb. 1850.)  
 36. Feb. 1850. (Pfeiffer, *ibid.*) (8 sheets=?; Bibl. Franç. 16 Feb. 1850.)  
 37. 18 May, 1850. (Pfeiffer, *ibid.*; up to no. 242=p. 181.) (9 sheets=pp. 213-248, Bibl. Franç. 18 May, 1850.) [Page 181 being the first of a new sheet, and species no. 243 on p. 182 being most distinctly included by Pfeiffer in the next part, we conclude that p. 181 was originally printed on a spare blank or on the wrapper of the part.]  
 38. 10 Oct. 1850. (Pfeiffer, 1851, p. 97.) (8 sheets, Bibl. Franç. 30 Nov. 1850)=pp. 182-?.  
 39. 15 Nov. 1850. (Pfeiffer, *ibid.*) (8 sheets=pp. 281-312, Bibl. Franç. 30 Nov. 1850.)  
 40. 10 Jan. 1851. (Pfeiffer, *ibid.*) up to p. 400. [Troschel, in Wiegmann's 'Archiv,' 1851, ii. p. 102, gives the contents of Lief. 35-40 as=pp. 41-376. We take it that while Troschel had part 40 before him he limited his analysis to pts. 35-39, since he was recording work published in 1850 only; and hence the discrepancy between his account and Pfeiffer's.]  
 41.  
 42. 30 July 1851. (Pfeiffer, ix. 1852, p. 97.) "Addition au genre *Helice*,"=pp. 401, 402; "Pulmonés sans opercule, genre *Bulimus*," pp. 1-260 (end). Pp. 153-184 of the general treatise. "Nouvelles additions à la famille des Limaces," pp. 96<sup>1</sup>-96<sup>2</sup>.

The completed works therefore stand as follows:—

1. Histoire naturelle . . . des Mollusques, &c.			
Tom. i. Titlepage (dated 1820-1851)	}		1851
Advertisement and Table			
Pp. 1- 40 .....			1839
41-376 .....			1850
377-402 .....			1851
Tom. ii. pt. 1. Titlepage (dated 1820-1851)			1851
Original titlepage (dated 1819)	}		
Dedication and Preface (=pp. i-xvi)			1819
Pp. 1- 96 .....			
96 <sup>a</sup> -96 <sup>z</sup> & 96 <sup>a</sup> -96 <sup>Λ</sup> .....			1823
96 <sup>1</sup> -96 <sup>24</sup> .....			1851
97-100 .....		1820 or 1821	
101-128 .....		? —1832	
129-152 .....		? —1839	
153-184 }			1851
pt. 2. Pp. 1-260 }			
2. Tableaux systématiques, &c.			
Tabl. syst. généraux, pp. i-xlvi .....			1822
Tabl. particuliers:			
I. Tabl. Fam. Limaces, pp. 1-27 .....		(dated)	1821
II. " " Limaçons, " 1-94 .....			1821
III. " " Auricules, " 95-114 .....			1821 ? *

\* Published before the Dict. Class. Hist. Nat. i. (1822). Cf. p. 90 of that work.

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XIV.—*New Species of Noctuidæ from Tropical America.*  
By W. SCHAUS, F.Z.S.

[Concluded from p. 51.]

YPSORA, gen. nov.

Antennæ pectinated to tips. Palpi long, upturned; first and second joints flattened, smoothly scaled; third joint as long as second. Fore tibia hairy; hind tibia smooth; mid tibia with long hairy tufts. Wings crenulate. Primaries: veins 7, 8, 10 from end of areole. Secondaries: vein 4 from lower angle of cell, 6 and 7 from upper angle.

*Ypsora santaris.*

Primaries dark violaceous brown, slightly mottled with buff on costa and on the inner margin near base; an oblique blackish shade from inner margin to orbicular, which is small, black; some indistinct median, light brown, oblique lines; reniform large, mottled with buff, and partly edged with white; outer line fine, black, curved and dentate beyond cell, interrupted by the veins, and chiefly distinct below vein 3; the subterminal yellowish buff, indistinct above vein 3, and shaded inwardly with dark streaks between 6 and 8. Secondaries with the costa paler; the outer lines dentate, velvety black; the subterminal yellowish buff, inwardly

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shaded with blackish brown; on both wings marginal dark points outwardly shaded with buff. Underneath light brown; two median, an outer, and a subterminal transverse shade; marginal blackish spots between the veins. Body dark violaceous brown above, light brown below; a transverse buff line on last segment of abdomen.

Expanse 40 millim.

*Hab.* Brazil.

*Pseudanthracia corvus.*

Body dark steel-grey. Wings dark steel-grey, irrorated with black striæ; the lines black. Primaries: the costa with some small white and larger dark brown spots; an interrupted basal line; the inner line angled twice above median, curved below it, partly geminate; a median wavy line, followed by a broader dark brown shade; a dark streak on discocellular; the outer line dark brown, oblique from costa, nearly straight to vein 3, then curved below discal streak, and wavy to inner margin, followed by a velvety black line; the subterminal line toothed between veins 3 and 4, hardly visible between 4 and 7, above which it is toothed twice, and below vein 3 it is inwardly curved, and is preceded by a brownish shade between inner margin and vein 2; a terminal line; fringe lighter grey. Secondaries with the outer and subterminal lines distinct; the striæ on outer margin rather thick. Underneath light grey, irrorated with darker scales; a faint outer line; blackish striæ on outer margins; a black discal point on secondaries.

Expanse 43 millim.

*Hab.* Orizaba.

PETEROMA, gen. nov.

Antennæ with fine cilia. Fore tibia with a long lateral tuft of hairs; hind tibia shortly haired and with a single pair of spines. Palpi porrect; second joint long, third short. Abdomen slight, hardly extending beyond hind wing. Wings crenulate, angled at vein 4.

*Peteroma jarinta.*

Body light brown; basal segment of abdomen dark velvety brown, crossed by a white band. Primaries dark buff, shaded with lilacine grey at base, in cell, and at origin of veins 2 and 3; a dark velvety-brown line from below median vein, near middle of cell, to inner margin near base; a fine black oblique streak on costa to base of subcostal vein; a fine oblique inner

line from costa to median vein; a median geminate fine line, very oblique to median vein at end of cell, then straight oblique from vein 3 to middle of inner margin, followed below vein 3 by a dark brown shade, which is crossed by the outer line; the outer line black, very deeply dentate, and ex-curved far beyond cell, preceded and followed between veins 5-7 by a dark brown shade; a white point at end of cell between veins 3 and 4; a subterminal buff line, shaded on either side with dark brown, and preceded by a pale buff shade between submedian and vein 3; a dark grey marginal spot between veins 3 and 5; a terminal dark line; fringe divided by a brown shade. Secondaries buff; a basal velvety brown band; median space tinged with grey, followed by a geminate dark line and then by two pale reddish-brown lines; the outer line fine, black, straight, followed by a brown space crossed by a still darker brown line; the subterminal and marginal spot as on primaries. Underneath buff, irrorated with dark brown; finely dentate geminate median and outer lines; a dark streak in cell on secondaries.

In the male there is a long streak of dark grey hairs below vein 6 on secondaries.

Expanse 40 millim.

*Hab.* Rio Janeiro, Petropolis.

*Peteroma carilla.*

Body light brown. Wings light brown, the lines darker brown; a few dark irrorations. Primaries: a basal line on costa; an inner curved and oblique geminate line; a geminate median line; the outer line fine, black, dentate beyond cell, then lunular to inner margin, thickened between veins 5 and 6; a blackish space from outer line to fringe at vein 4; sub-terminal partly geminate, indistinct; a black point as orbicular; reniform semilunar, white; a terminal wavy black line; a lilacine space below costa from outer line to subterminal. Secondaries: the base more thickly irrorated with dark scales; an inner line; a geminate median line; outer line very distinct, blackish; the subterminal geminate, partly followed by a reddish-brown shade; a black spot at end of vein 4; a terminal dark line. Underneath buff, irrorated with brown; dark discal points; a geminate median line; an outer line; a subterminal dark shade.

Expanse 31 millim.

*Hab.* Aroa, Venezuela.

*Peteroma conita.*

Head and collar brown. Thorax lilacine grey. Body



mottled grey and brown, with darker irrorations. Primaries buff, irrorated with a few black scales; a light brown oblique inner band from costa to median vein; a velvety brown line from origin of vein 2 to inner margin near base, broadly shaded inwardly with lilacine; an orbicular black point; a black discocellular streak, preceded and followed by a brown shade, and then outwardly by a white and lilacine shade; outer line angled below costa, then oblique to discocellular, forming a deep outward curve between 3 and 5, and again inwardly curved to middle of inner margin; below vein 3 the outer line is inwardly broadly shaded with dark brown from veins 4-7, and outwardly shaded with dark brown to the subterminal; a velvety brown streak on vein 7 from outer line to subterminal; subterminal pale buff, preceded by dark spots on veins 2-5 and on submedian; outer margin light brown, darker towards apex; a broad black streak from subterminal on to fringe along vein 4; black submarginal points between the veins; an indistinct dark terminal line. Secondaries somewhat darker buff, irrorated with black scales; a black discal point; a fine reddish-brown subterminal line, inwardly shaded with pale buff and outwardly followed by a broader reddish-brown line from anal angle to vein 5; a black marginal spot at vein 4 extending on to fringe. Underneath buff, irrorated with dark brown; brown discal points; a faint geminate median line; a finely lunular distinct outer line; a faint subterminal shade; submarginal black points; black marginal spots at vein 4; costa of primaries whitish from outer line to apex.

Expanse 38 millim.

*Hab.* Aroa, Venezuela.

*Peteroma dastona.*

Body dark grey; abdominal segments posteriorly black. Primaries: basal third of costal margin broadly blackish, irrorated with brown; a light grey space from inner margin at base to median line on costa, followed below the median by a velvety black line; median space below cell very dark grey, crossed by a fine black median line; reniform large, white; outer line dentate, white from costa to vein 7, then velvety black and inwardly curved to inner margin; a blackish shade from reniform to apex; outer margin dark grey, paler about the inner angle; subterminal fine, black, wavy, outwardly shaded with white at apex and below vein 3. Secondaries dark grey; a minute white discal spot, followed by two darker grey lines; a pale grey outer band, crossed by a dark

line and outwardly edged by a black line; a black subterminal line; outer margin broadly pale grey, with a single dark line beyond the subterminal; a terminal wavy black line. Underneath brown; dark discal points; a geminate median line; an outer line and a subterminal shade.

Expanse 36 millim.

*Hab.* Oaxaca, Mexico.

*Peteroma albilinea.*

Body and wings brown. Primaries: a white band from base of inner margin to subterminal line near apex; the costal margin mottled with white; the subterminal white, from costa near apex to inner angle; reniform large, reddish brown, outlined with white; faint submarginal black spots. Secondaries: a subterminal white line. Underneath light brown; a darker subterminal shade.

Expanse 35 millim.

*Hab.* Rio Janeiro.

*Cænipeta nubila.*

Head, collar, and abdomen greyish brown. Thorax grey. Primaries light grey, the lines greyish brown and geminate; the basal line not reaching inner margin; the inner line curved, dentate; the median line slightly wavy, crossing the reniform, which is large, finely outlined in brown, and contains a dark point; the outer line thickened on costa, where it is whitish, finely lunular, hardly incurved below vein 3; the subterminal white, wavy, broadly shaded inwardly with dark brown from vein 3 to costa, and followed by a narrow dark shade; a terminal dark line. Secondaries greyish brown, the outer line blackish, indistinct; the subterminal buff, narrow, from anal angle to vein 6; some pale markings on outer margin. Underneath very similar to *C. polynoe*, Gn., but the white spot on costa of primaries is smaller.

Expanse 35 millim.

*Hab.* Peruvian Amazons.

*Cænipeta fragilis.*

Head and thorax grey. Abdomen pale yellow. Primaries light grey, irrorated with pale umber-brown scales; median line black, other lines umber-brown; a basal line; inner line oblique at costa, then lunular to inner margin; median line geminate on costa, somewhat oblique outwardly to below vein 2, then slightly curved inwardly to inner margin; reniform large, umber-brown, enclosing some grey

scales; outer line geminate, angled beyond cell, close to median line on inner margin; subterminal geminate near costa, suffusing and forming large blotches below vein 5; terminal dark spots; fringe grey, spotted with umber-brown. Secondaries pale yellow; outer margin broadly black from apex to vein 4, then divided by a marginal dentate yellow shade to anal angle; a faint median dark line; an irregular dark outer line from anal angle to vein 6; fringe pale yellow. Underneath: primaries dark brownish grey; the base and inner margin whitish; a white discal spot; traces of an oblique median line and angled outer line. Secondaries pale yellow; a dark discal point; an interrupted outer line; a broad marginal dark shade, interrupted by pale yellow at apex and between veins 2 and 4.

Expanse 32 millim.

*Hab.* Aroa, Venezuela.

*Baniana ypita.*

Head and collar reddish brown. Thorax light brown, anteriorly shaded with dark velvety brown. Abdomen dull brown. Primaries light brown, irrorated with darker scales; lines reddish brown, inwardly shaded with buff; the inner line angled below costa, then slightly curved inwardly to middle of inner margin; outer line straight from costa at three fourths from base to inner angle; reniform large, pale brown, inwardly edged by a semilunar dark line; subterminal fine, dark brown, angled five times; terminal dark spots between the veins. Secondaries dark brown; fringe yellowish. Underneath dark greyish brown, without lines.

Expanse 32 millim.

*Hab.* Aroa, Venezuela.

Allied to *B. veluticollis*, Hamps.

*Baniana? veluta.*

Antennæ thick, with a row of cilia for half their length, then nodose and curved, thinner, with shorter cilia to tips. Palpi and collar black; vertex and thorax buff. Abdomen brownish grey. Primaries buff, darker on outer margin, thinly irrorated with dark scales; some violaceous black scales at base of inner margin, followed by a large, irregular, dark velvety brown trigonate spot, extending just above median vein; some whitish and black scales at end of cell and just beyond cell; terminal black spots between the veins. Secondaries dark greyish brown, paler at base. Underneath:

primaries brown; secondaries with the inner area buff, irrorated with brown and a brownish discocellular spot.

Expanse 27 millim.

*Hab.* Trinidad.

Sexes similar, the female antennæ simple.

*Poesula gorima.*

Palpi, head, and collar reddish brown. Abdomen violaceous brown above; anal tuft yellow. Primaries light violaceous brown; a broad, outwardly oblique from costa, dark brown inner shade; the inner margin dark brown from inner to outer line; an oblique median shade on costa, from which there is a fine irregular line to inner margin; a black point as orbicular, a dark discocellular streak as reniform; outer line straight, at three fourths from base, dark brown, inwardly shaded with lighter brown; the space beyond to subterminal also dark brown; subterminal irregular, outwardly dentate between veins 3 and 4; a terminal dark line with black points between the veins. Secondaries blackish brown, darkest on outer margin; a black discal spot; fringe ochreous brown. Underneath: primaries dark grey; the costa ochreous brown: secondaries whitish, irrorated with darker scales; a black discal point; a fine outer line.

Expanse 32 millim.

*Hab.* Rio Janeiro.

*Phurys jaliscana.*

Body brownish grey. Primaries light brownish grey; a fine median line, pale, outwardly shaded with dark brown above inner margin, angled on costa, slightly curved inwardly to inner margin, and preceded below the submedian by a velvety black spot; a dark streak at end of cell, crossed by a fine darker grey line, and followed by two more similar lines; a pale line from costa near apex to inner margin near angle, slightly curved, broadly shaded outwardly with dark brown; a subterminal greyish line, outwardly lunular between the veins; minute black points at tips of veins. Secondaries brown at base, the outer margin broadly dark greyish brown. Underneath brown; traces of a dark outer line and broad subterminal dark shade; some fulvous hairs at base of secondaries.

Expanse 42 millim.

*Hab.* Guadalajara, Mexico.

Allied to *P. flexa*, Gn.



*Phurys monaxa.*

Head and thorax dark grey. Abdomen brownish. Primaries grey, irrorated with brown scales; lines dark brown, inwardly shaded with light grey; inner line nearly straight, slightly more distant from base on inner than on costal margin; outer line at two thirds from base, parallel with outer margin; a dark brown discocellular streak; a fine dentate subterminal dark line, marked with black points on veins, and a terminal outwardly lunular line, the two lines connected by streaks on veins; the subterminal preceded by some pale grey streaks on veins. Secondaries brown, shaded with yellow at base; a terminal black line; a faint dark outer line. Underneath buff, thickly irrorated with brown; a dark outer line.

Expanse 32 millim.

*Hab.* Orizaba, Mexico.

*Phurys escondida.*

Head and thorax grey. Abdomen light brown. Primaries grey, thickly irrorated with brown scales; an oblique brown shade from veins 3-6; a subterminal brown shade from near apex to submedian vein near angle; an indistinct brown line below median vein from base, not reaching the subterminal; a dark terminal line. Secondaries brown; a darker subterminal shade. Underneath brown, without lines.

Expanse 32 millim.

*Hab.* Castro, Parana.

*Phurys bigutta.*

♀.—Head and thorax buff. Abdomen light brown. Primaries light brown, irrorated with black scales, thinly at base, more thickly outwardly; inner line buff, outwardly shaded with darker brown, oblique from inner margin at one third from base to subcostal before reniform; reniform consisting of two superposed black spots; outer line from near apex to inner margin near angle, buff, shaded finely with reddish brown, and again outwardly broadly with black; minute black points at tips of veins. Secondaries similar; the outer line pale, less distinct, broadly shaded outwardly with black. Underneath light brown, the outer margin broadly darker.

Expanse 36 millim.

*Hab.* Jalapa, Mexico.

*Phurys navilla.*

Body light brown. Primaries light brown, thinly irrorated

with black scales ; an indistinct basal line, curved to base of inner margin ; inner line darker brown, inwardly shaded with pale reddish brown, straight from costa to inner margin, followed in cell by a white spot, which is then followed by a small black spot ; a subterminal reddish-brown line, inwardly edged with buff, and followed by black spots on veins ; terminal black points at tips of veins. Secondaries brown, thickly irrorated with black scales ; a subterminal black shade, widest at apex. Underneath brown ; darker discal points.

Expanse 39 millim.

*Hab.* Jalapa, Mexico.

*Phurys dentilinea.*

Head and thorax light grey. Abdomen light brown. Primaries light grey ; a faint basal line ; the inner line pale, slightly shaded outwardly with olivaceous brown, somewhat curved inwardly, more remote from base on inner margin than on costal margin, and preceded in the male by a small velvety black spot on the inner margin ; reniform large, outwardly and inwardly marked by a dark line, closely followed by two fine, dentate, darker grey lines ; a buff line slightly shaded outwardly with brown from costa near apex to inner margin near angle ; a subterminal fine dentate dark grey line ; a terminal similar line. Secondaries light brown on basal two thirds ; the outer margin dark greyish brown ; a buff outer line between the pale and dark portion. Underneath light brown ; a darker outer line.

Expanse 42 millim.

*Hab.* Orizaba, Mexico.

*Mocis griscescens.*

♀.—Body grey. Primaries grey ; basal line fine, broad, straight from costa to median vein ; inner line fine, velvety brown, outwardly shaded with reddish brown, outwardly oblique from costa, angled on subcostal vein, preceded on inner margin by a velvety black spot ; orbicular represented by a small buff point ; reniform large, oval, consisting of a fine brown line ; two fine oblique lines from costa to reniform, and a wavy fine line from reniform to inner margin ; outer line fine, geminate, outwardly lunular, followed by a reddish-brown line, oblique from costa, forming two slight curves above and below vein 7, then straight to inner margin, and immediately followed by the subterminal blackish shade, which is straight from costa near apex to vein 7, then dentate to inner margin ; a few black points on veins beyond the

subterminal ; a dark terminal dentate lunular line ; fringe grey. Secondaries grey, tinged with brown at base and on costa ; a fine wavy reddish-brown outer line from inner margin to vein 4 ; a dark grey subterminal shade from above anal angle, not extending to apex. Underneath brownish grey ; faint traces of an outer line.

The male is darker, especially about outer line and subterminal shade.

Expanse 43 millim.

*Hab.* Jalapa, Mexico.

*Mocis valina.*

Head and thorax grey. Abdomen brownish. Primaries grey ; the basal line velvety brown, nearly straight from costa to submedian ; the inner line pale, outwardly shaded with dark brown, slightly curved obliquely to submedian, then outwardly oblique to inner margin, and preceded below the submedian by a velvety black spot ; orbicular represented by a white point ; reniform finely outlined in dark brown, surmounting an equally large circular line, both containing a dark streak ; two oblique dark shades from costa to reniform ; a fine median line from cell to inner margin, dentate ; the outer line finely dentate, angled and curved below costa, followed from vein 7 to inner margin by a straight reddish-brown line, shaded on either side by buff ; the subterminal dark brown shade from costa to inner margin adjoining the outer buff shade, and followed by a row of conspicuous black points on the veins ; a fine brownish terminal lunular line. Secondaries brown ; a fine outer brown line, angled close to inner margin, and hardly reaching costa ; a dark subterminal line above anal angle. Underneath brown ; an outer darker line ; a discal dark point on secondaries.

Expanse 42 millim.

*Hab.* Guadalajara, Mexico.

*Heteropygas filena.*

Head and thorax lilacine brown. Body brownish. Primaries lilacine ; a fine, irregular, broad inner line ; orbicular represented by a brown point ; reniform larger, edged with brown ; a brown outer line angled at vein 6, outwardly shaded with whitish and inwardly with dark brown between the median and submedian veins, especially dark at origin of veins 2 and 3 ; a little shading between the cell and angle of outer line ; costa finely olivaceous brown, with yellow spots towards apex ; a dark brown subterminal shade from apex to

inner margin near angle, outwardly shaded with reddish brown. Secondaries light brown, a dark subterminal shade. Underneath: primaries greyish, the margin narrowly, the apex broadly light brown; a dark discal streak: secondaries buff, irrorated with brown, a dark median line.

Expanse 33 millim.

*Hab.* Castro, Parana.

*Argidia subapicata.*

Palpi and fore coxæ ochreous. Body fawn colour. Primaries light brown, the costa broadly tinged with roseate beyond inner line; the cell tinged with ochreous; the inner and median lines fine, dark, parallel, forming three outward curves; two oblique dark shades from costa, one to median line, the other to reniform; the reniform large, finely outlined, and divided vertically by a dark line extending beyond cell and above subcostal vein; the outer line fine, dark, geminate, angled at vein 7, followed from vein 7 to costa by a broad dark brown space; between the submedian and vein 4 a pale buff shade; three subterminal black points between veins 3 and 5; a terminal fine dark line. Secondaries light brown; a dark wavy inner line; a straight outer line, dark brown, partly followed by a fine blackish line; a subterminal irregular brown line. Underneath: primaries with a large costal spot reaching apex, inwardly bordered by a semilunar dark brown line, and crossed by a darker brown oblique shade; costal margin to spot broadly white; outer margin and disc brown; lines darker, fine, inner and median lines straight, outer and subterminal lines wavy; orbicular and reniform large, whitish, the former cut by the inner line, the latter with a vertical fine dark line: secondaries yellow; fine dark inner, outer, and subterminal lines.

Expanse 45 millim.

*Hab.* Rio Janeiro.

Allied to *A. palmipes*, Gn.

*Thermesia pallescens.*

Body and wings grey, thinly irrorated with black scales. Primaries: the costa and lines light reddish brown; the inner line indistinct, nearly straight, faintly shaded inwardly with buff; the outer line broader, deeply angled below costa, outwardly shaded with buff; the orbicular small, vague, dark grey; the reniform large, light reddish brown, not very distinct; fringe brown. Secondaries: the outer line straight as on primaries; a small black discal spot near base; fringe



light brown. Underneath fawn-colour, irrorated with black scales; two black points in cell of primaries, one on secondaries. The wings are faintly angled at vein 4.

Expanse 40 millim.

*Hab.* São Paulo, S.E. Brazil.

*Sanys evanescens.*

Head and thorax greyish brown. Abdomen brown. Wings buff, irrorated with grey and light brown. Primaries: a fine dark inner line, inwardly shaded with whitish scales, slightly oblique inwardly from costa; orbicular large, round; reniform large, kidney-shaped, outlined in dark brown; a pale buff line, shaded on either side with dark brown from costa near apex to inner margin of secondaries; an oblique brown shade from costa to vein 7 before this line; subterminal black spots, outwardly shaded with white; a terminal brown line and black points on both wings. Secondaries with a dark discal point. Underneath greyish buff; dark discal points; subterminal dark points on primaries.

Expanse 30 millim.

*Hab.* Aroa, Venezuela.

Allied to *S. irrosea*, Gn. = *Thermesia lara*, Schaus.

*Sanys capsicata.*

Palpi: second joint outwardly brown, inwardly buff; third joint grey, tipped with blackish. Vertex brown. Collar velvety black anteriorly, grey posteriorly. Thorax and abdomen grey. Wings greyish buff, irrorated with dark grey striæ. Primaries: inner line hardly visible; a median black costal streak; outer line broad, light reddish brown, angled below costa, spotted with white on veins, followed by a black spot above and another below the submedian vein; a blackish apical shade; a wavy black terminal line. Secondaries: the outer and terminal lines as on primaries; a subterminal dark grey shade; a black discal point surrounded by buff. Underneath brownish grey. Primaries with orbicular and reniform represented by black points: secondaries paler; the outer margin brownish grey; a broad velvety brown discocellular streak.

Expanse 42 millim.

*Hab.* Aroa, Venezuela.

*Ophisma sinuata.*

Body pale brownish grey. Primaries pale brownish grey; a whitish wavy basal line; inner line fine, whitish, oblique

from costa to below cell, where it is angled, then inwardly oblique to inner margin; an irregular whitish line, forming a triangle, the base on costa, the apex at vein 2, enclosing the reniform, which consists of two brown points, one above the other; outer line fine, straight, white, followed by a broad brown shade which reaches the apex, though cut before apex by an oblique white line from costa; this brown shade forms on its marginal side two inward curves from above and below the middle of the space between veins 3 and 4; some marginal dark points between the veins. Secondaries brown, palest and shaded with grey on outer margin between angle and vein 6. Underneath grey, finely irrorated with brown; a dark outer line, followed by a subterminal dark shade, broadest on primaries; minute discal points; on secondaries a faint median line.

Expanse 42 millim.

*Hab.* Aroa, Venezuela; Coatepec, Mexico.

*Ophisma variata.*

*Form 1.*—Body brown. Primaries: basal third brown, with traces of pale basal and inner lines, parallel and oblique from costa; a broad grey median band, nearly straight and cut by a black line on its inner side; outer space mottled ochreous and reddish brown, shaded with brown on inner margin and outer margin, broadly between veins 4 and 6; an oblique white line from costa to dark marginal shade at vein 6; two superposed black points at end of cell; marginal black points shaded with lilacine; a terminal brown line; fringe light brown, palest at base; some white points on costa near apex.

*Form 2.*—Primaries almost entirely brown; the median band reduced to a pale line; a few reddish-brown shadings on outer portion of wing; the white costal streak reduced.

*Form 3.*—Primaries greyish brown; a median pale line; an outer wavy reddish-brown shade; a subterminal whitish shade. Secondaries in all three forms brown or black-brown; an indistinct pale outer line to above anal angle; a terminal dark line at anal angle, which is slightly excised; sometimes a pale shading on outer margin and fringe. Underneath: costal and outer margin of primaries and entire secondaries shaded with lilacine and irrorated with brown scales; a fine dark outer line and subterminal wavy line; the outer margin of primaries more or less broadly dark brown.

Expanse 36–44 millim.

*Hab.* Aroa, Venezuela; Castro, Parana.

*Bendis pannisca.*

Body brownish lilacine. Primaries lilacine, thinly irrorated with brown scales; the lines and outer margin brown; a basal and an inner wavy line; a minute brown point as orbicular; a straight median band; an outer line, curved beyond cell, then inwardly oblique to inner margin; a dark median shade from costa near apex to inner margin at three fourths from base; some indistinct dark marginal points between the veins. Secondaries brown, palest at base, irrorated with darker brown and lilacine scales; a darker median shade; the outer line fine, outwardly shaded with lilacine; a dentate subterminal line. Underneath brown, the median and outer lines very indistinct.

Expanse 32 millim.

*Hab.* Castro, Parana.

*Gonodonta mexicana.*

Palpi olivaceous grey. Vertex whitish. Collar, thorax, and tufts on abdomen dark olivaceous grey. Abdomen bright yellow. Primaries dark olivaceous brown, slightly paler towards the outer margin, which is irrorated with lilacine and pale olivaceous-brown scales, the dark and lighter space separated by a subterminal undulating grey line, outwardly shaded with reddish brown and followed by some brown points on veins; from apex to vein 6 a marginal wavy line; the subterminal terminating at inner angle and preceded below vein 2 by a small black spot, containing some pale scales; the reniform consisting of a darker line surmounted by a black point; at base a light olivaceous-brown spot outwardly bordered with reddish brown and white; the costal margin creamy white, the sinus deeper than in *holosericea*, Gn., shaded with reddish brown and olivaceous, containing lilacine scales. Secondaries orange; some dark hairs on inner margin, the outer margin broadly black, especially at apex. Underneath: primaries grey; the costal margin yellow; some yellow hairs at base of cell: secondaries yellow, some marginal black spots between veins 2 and 6.

Expanse 42 millim.

*Hab.* Jalapa, Mexico.

In *holosericea*, Gn., the margins of secondaries below are broadly black.

*Euthermisia distincta.*

Body light lilacine brown; underneath the collar a dark velvety space. Primaries: the base and outer margin brown

tinged with lilacine; the median space light brown or pale buff, thinly irrorated with dark scales; the lines dark brown; the inner line nearly straight, the median represented by an oblique streak on costa and a similar streak on inner margin, both outwardly oblique; the outer line deeply angled below costa, with a dark streak from angle to apex, the outer line outwardly shaded with buff, followed by a blackish shade on inner margin; subterminal dark spots between veins; a black point for orbicular; reniform large, outlined in dark brown. Secondaries brownish; the outer line fine, dark brown, most distinct on inner margin; subterminal black spots above anal angle. Underneath light brown, irrorated with dark grey; an outer finely wavy dark line; subterminal spots most distinct on secondaries; whitish discal spots on secondaries divided by a blackish spot.

Expanse 33 millim.

*Hab.* Castro, Parana.

*Renodes chacma.*

Body and wings greyish buff, irrorated with darker scales. Primaries: the costa finely yellow; blackish spots at origin of veins and towards apex; lines fine, dark brown, edged on either side with ochreous brown; the inner line indentate in cell; the outer line curved beyond cell; the reniform reddish brown, with darker scales; terminal black spots inwardly edged with white, the largest just below apex. Secondaries with the outer and terminal lines as on primaries; the inner line vague and not reaching inner margin. Underneath buff, irrorated with dark brown; the primaries suffused with brown; traces of an outer line; discal spot consisting of geminate black lines on primaries; a dark patch on secondaries.

Expanse 22 millim.

*Hab.* Rio Janeiro.

PAGYRA, gen. nov.

Antennæ pectinated. Palpi ascending, not stout; second joint long, third very short. Legs smooth; hind tibia with a single pair of spurs. Wings broad, outer margins rounded; anal angle of secondaries acute.

*Pagyra calgia.*

Head and collar reddish brown. Thorax and abdomen grey. Wings greyish buff; a subterminal row of reddish-brown spots; a terminal red line; fringe roseate. Primaries:



costa finely reddish brown; a wavy reddish-brown inner line; a wavy brown median line; a brown point as orbicular; reniform large, outlined in reddish brown; outer line fine, black, slightly curved below costa, outwardly shaded with reddish brown and a few white scales on veins 2-4. Secondaries: an indistinct blackish median line; outer line reddish brown, spotted with white on veins. Underneath: primaries light brown, secondaries whitish; an indistinct dark outer line.

Expanse 35 millim.

*Hab.* Castro, Parana.

*Triommatodes madrina.*

Head dark brown. Thorax, abdomen, and wings violaceous grey, the markings blackish brown. Primaries: a basal spot; a wavy fine inner line; a broad median shade; orbicular and reniform both large, finely outlined; outer line very oblique from costa, angled below vein 7, forming a slight inward curve to below 5, then wavy, fine to inner margin, pale buff between veins 3 and 8, broadly shaded inwardly with dark brown between veins 4 and 7, and outwardly shaded with blackish from veins 4 to 7; the dark shade continuing towards costal margin near apex; above the oblique portion of outer line is a pale brown shade; costa with pale spots towards apex; indistinct subterminal and marginal spots. Secondaries: a broad median shade, paler than on primaries, terminating in a small dark brown spot on inner margin; outer line dark brown, outwardly shaded with buff; a dark anal spot on inner margin. Underneath grey, pale lunular discocellular marks shaded on either side with dark grey; the dark outer line indistinct.

Expanse 34 millim.

*Hab.* Orizaba, Mexico.

*Triommatodes padrina.*

Head brown. Thorax grey. Abdomen dark grey. Wings dull grey, irrorated with dark brown scales. Markings brown. Primaries: a small basal spot; a wavy fine inner line; a broad median band, divided by a greyish line; the orbicular and reniform both large, finely outlined in brown; an outer fine angular line, inwardly shaded with buff above vein 4, where it crosses a large brown patch which extends to costal margin near apex; subterminal black points between the veins; a brown patch between veins 5 and 6 and a smaller subapical patch; marginal black points and a fine terminal

black line on both wings. Secondaries: a dark median, geminate, dentate shade, thickening on inner margin; outer line fine, irregular, dentate-lunular, followed by some brown scales on inner margin; subterminal black points. Underneath grey, irrorated with brown; a distinct, finely lunular, dark outer line; dark discal points, two subapical points on primaries; a median shade on secondaries.

Expanse 38 millim.

*Hab.* Casa Branca.

*Triommatodes subrita.*

Body and wings dull brownish grey. Primaries: inner line fine, brown, not extending below cell, but there is a brown point on submedian vein; a median brown shade outwardly curved in cell, where it is followed by a brown quadrate spot, then somewhat oblique inwardly, and less heavily marked to inner margin; a large brown space from vein 4 to costa, where it widens towards apex, and is also paler; this space is cut by the outer line, which is yellowish brown, very oblique outwardly to vein 7, then straight to vein 4, below which the line is minutely punctiform, dark brown on veins; subterminal and marginal dark points; a terminal dark line. Secondaries: a dark brown median line; outer punctiform spots dark brown, outwardly shaded with yellowish scales, the spot on inner margin large; subterminal marginal spots and terminal line as on primaries. Underneath with dark discal points, median and outer wavy dark lines, more heavily marked on secondaries.

Expanse 39 millim.

*Hab.* Casa Branca, Brazil.

*Capnodes incurvata.*

Body and wings dark greyish brown. Primaries: a narrow inner line, brownish buff, slightly curved on costa, then straight to inner margin; a black point as orbicular; a velvety brown discocellular streak, irrorated with white scales, followed by a lilacine buff spot containing some dark scales, and surmounted by some white scattered scales; the outer line oblique, white on costa, curved from subcostal to vein 3, buff, inwardly shaded with dark velvety brown, then following vein 3 to cell, below which it is somewhat oblique outwardly to inner margin; small white spots on costa before apex, a subterminal reddish-brown shade; marginal dark brown points outwardly shaded with white. Secondaries: a whitish discal spot; outer line nearly straight; subterminal shade

less distinct. Underneath brown, irrorated with whitish scales; a whitish outer line; white marginal points; a white discal spot on primaries; the primaries have the apex acute, slightly falcate, much rounded between veins 3 and 5.

Expanse 38-41 millim.

*Hab.* Casa Branca, Brazil.

*Capnodes quarima.*

Wings brown, slightly tinged with violaceous and irrorated with black scales. Primaries: the inner line dark brown, inwardly shaded with ochreous brown and mottled with white on costal margin; a white discal point, circled with dark brown; outer line dark brown, outwardly shaded with ochreous brown, curved beyond cell, and followed by a white spot on costal margin; four small pale costal spots before apex; irregular subterminal black spots between the veins; a terminal black line, thickening between the veins. Secondaries: two small superposed black discal spots; outer line as on primaries, also subterminal spots; faint paler brown spots at tips of veins. Underneath: primaries light brown; secondaries buff, irrorated with darker brown scales; a dark outer line, heaviest on secondaries, and a dark discal spot on same wings.

Expanse 28 millim.

*Hab.* Rio Janeiro.

Allied to *C. laranda*, Druce.

*Capnodes marita.*

Body and wings light brown, markings black. Primaries: a basal spot, a fine inner line nearly straight, faint; orbicular small, well defined; a fine median shade thickening on costa, median vein, and inner margin; reniform consisting of two superposed contiguous rings, inwardly oblique towards costa; outer line punctiform below vein 7, the spots outwardly shaded with white, and the spot on inner margin largest; irregular subterminal spots between the veins, increasing in size towards the inner margin; a fine terminal brown line. Secondaries: outer and subterminal spots, also terminal line, as on primaries; a broad transverse streak in cell. Underneath brownish buff, the outer margins darker; subterminal and terminal black spots between the veins; primaries, two black spots in cell; secondaries, a broad black discocellular streak.

Expanse 30 millim.

*Hab.* Aroa, Venezuela.

*Capnodes undilla.*

Body and wings lilacine brown, markings black; subterminal and terminal black spots between the veins; outer line finely lunular, broken on secondaries, partly geminate, and followed by an indistinct pale brown shade. Primaries: a faint basal line; a wavy inner line, geminate on costa; a few dark scales as orbicular; reniform consisting of two contiguous circles, the lower one partly filled in with black. Secondaries: a black discal point. Underneath: primaries greyish brown; a dark discocellular streak; a faint outer line; pale costal spots before apex: secondaries yellowish buff, greyish on outer margin; a discocellular streak; a median spot on costal margin; some outer spots near inner margin.

Expanse 30 millim.

*Hab.* Aroa, Venezuela.

*Capnodes stelligera.*

Body brown, spotted with white. Wings brown, with a few scattered pale green scales. Primaries: some scattered clusters of white scales at base and in place of the inner line; a large pale green spot on inner margin near base; reniform large, circled with white, partly filled in with pale green scales, and closely followed by a broken white line, suffusing with the outer line on inner margin; the outer line geminate, consisting of small clusters of white and pale green scales; subterminal and marginal white spots, which are very small between veins 3 and 5; basal half of fringe brown, spotted with white, outer half mottled white and grey. Secondaries: the inner margin shaded with metallic violaceous; some small white spots in discal area; outer line geminate, punctiform, white; subterminal marginal spots and fringe as on primaries. Underneath: primaries brown; the outer margin greyish; white costal spots before apex: secondaries buff; the outer margin grey; the costa shaded with brown; an outer and a broader subterminal brown shade; a large brown discal spot.

Expanse 28 millim.

*Hab.* Petropolis, Brazil.

*Capnodes vacca.*

Head and collar ochreous brown. Thorax violaceous brown; abdomen greyish brown. Primaries ochreous brown; the outer margin broadly tinged with olivaceous brown;



inner and outer lines violaceous below subcostal vein, spotted with white on veins, above subcostal vein white; a wavy median violaceous shade; orbicular small; reniform large, quadrate, violaceous; subterminal dark spots, outwardly shaded with lighter brown; terminal dark shades between the veins. Secondaries somewhat olivaceous brown; outer, subterminal, and terminal spots as on primaries; a dark discal spot. Underneath brownish yellow; the outer margins browner; a dark outer line; a streak and geminate spot in cell of primaries; a geminate discocellular streak on secondaries.

Expanse 38 millim.

*Hab.* Jalapa, Mexico.

*Capnodes diffidens.*

Body brown. Wings brown, irrorated thinly with black scales. Primaries: a basal and an inner wavy black line; orbicular minute, black; reniform large, white, irregular; an outer curved black line, finely lunular below vein 4; a subterminal black shade below costa; terminal black spots inwardly shaded with white. Secondaries with only an outer finely lunular black line, and the terminal points as on primaries. Underneath: primaries brown; a faint outer line; a subterminal line terminating in a large black costal spot: secondaries pale buff, thinly irrorated with brown; a black discal spot; terminal black points.

Expanse 28 millim.

*Hab.* Castro, Parana.

*Capnodes palindica.*

Body dark brown. Wings dark brown. Primaries: the base and outer space slightly paler than median space; inner line slightly curved, darker brown, spotted with white on costa, median and submedian veins; orbicular very small, black; reniform large, black; outer line curved below costa to vein 7, fine, whitish, below vein 7 nearly straight, broad, white, with long black striæ, followed by a paler brown space; subterminal black spots between the veins, shaded with grey; terminal black spots between the veins. Secondaries: a black discocellular streak; outer line, subterminal and terminal spots as on primaries. Underneath: primaries light brown: secondaries buff, irrorated with brown; black discal spots; a fine lunular outer line; a fine subterminal shade; terminal black spots.

Expanse 27 millim.

*Hab.* Castro, Parana.

*Capnodes borrega.*

Body dark violaceous grey. Wings dark violaceous brown. Primaries: an inner and an outer darker shade minutely spotted with yellow on veins, and originating from two large white costal spots, edged with yellow and containing some yellow scales; a row of subterminal yellowish spots; marginal pale spots between the veins and terminal pale spots at ends of veins. Secondaries: a black discal mark; a large light brown spot between discal mark and outer shade; outer shade, subterminal and marginal spots as on primaries. Underneath: primaries greyish brown; some whitish costal spots; a dark discocellular line; indistinct dark outer and subterminal shades. Secondaries grey, the outer margin broadly dark grey; a large black discal spot; an outer dark grey line.

Expanse 28 millim.

*Hab.* Coatepec, Jalapa, Mexico.

*Capnodes lola.*

Body and wings lilacine buff. Primaries: the costa darker, spotted with yellow, especially on outer half; some dark flecks at base; traces of a fine dark inner line; orbicular consisting of a dark point; reniform oval, faintly outlined in dark brown; outer line nearly straight, interrupted by the veins, geminate, the inner portion most heavily marked; a subterminal dentate line, geminate, interrupted by the veins; terminal black spots. Secondaries: two small superposed discal spots; outer, subterminal and terminal markings as on primaries. Underneath buff; outer and subterminal dark lines; on primaries orbicular small, reniform larger, black; a black discal spot on secondaries.

Expanse 22 millim.

*Hab.* Trinidad; Aroa, Venezuela.

*Capnodes harmodia.*

Body brown. Wings brown. Primaries: an inner transverse white line, forming three slight outward curves; an outer white line, oblique from costa, curved beyond cell; a white discocellular streak; the median vein, also veins 2-6, and submedian vein white to beyond outer line; four small yellow spots on costa before apex; a subterminal row of black spots between the veins; a fine subterminal reddish-brown line. Secondaries: a finely wavy outer white line; veins 2-6 streaked with white on either side of outer line; subterminal black spots. Underneath buff, irrorated with

brown; dark brown discal spots; a dark outer line; traces of subterminal spots.

Expanse 32 millim.

*Hab.* Peru; Castro, Parana.

*Capnodes? sabulosa.*

Head buff, collar grey. Thorax violaceous brown. Abdomen grey, mottled with reddish brown. Primaries to outer line grey, thickly irrorated with brown and black scales; the base and an oblique median costal shade somewhat darker; a blackish discocellular mark; outer margin broadly reddish brown, on which is the outer line, consisting of a curved row of white spots on veins, followed on costa by a black space; the veins somewhat streaked with black; a blackish shade from costal spot to outer margin at vein 4; some terminal reddish shades. Secondaries yellowish, thickly irrorated with reddish brown except between veins 4 and 6; veins irrorated with black, grey, and red; outer white points on veins connected by a dark lunular line; a black and red cluster of scales at end of cell, fringe mottled yellowish and red. Underneath whitish, irrorated with red scales, especially towards outer margins; a geminate median and an outer finely wavy black line; a dark discal spot on secondaries.

Expanse 28 millim.

*Hab.* Orizaba.

*Rhosologia tripuncta.*

Palpi: second joint dark brown, third joint buff. Body whitish buff. Primaries whitish buff, thinly irrorated with light brown scales, forming faint outer and subterminal punctiform lines; three dark velvety brown spots; the orbicular small, round; the reniform thick, outwardly toothed below, and an elongated spot below the median vein; black terminal points. Secondaries whitish buff, the outer margin irrorated with brown; a dark discal spot; terminal points less distinct. Underneath pale buff, thinly irrorated with light brown; a brown lunular discocellular spot on secondaries.

Expanse 35 millim.

*Hab.* São Paulo, S.E. Brazil.

*Rhosologia brunnea.*

Palpi outwardly dark velvety brown. Head, collar, and thorax lilacine buff. Abdomen greyish brown. Primaries

reddish brown, thinly irrorated with black; orbicular minute; reniform larger, dark grey, both indistinct; an outer row of minute black spots on veins; subterminal small black spots above vein 4; terminal black spots. Secondaries dark greyish brown; fringe reddish brown. Underneath: primaries dark grey: secondaries buff, irrorated with blackish-grey scales; a subterminal dark band, interrupted by the veins; a dark discal spot.

Expanse 35 millim.

*Hab.* Aroa, Venezuela.

*Rhosologia discata.*

Palpi outwardly black, inwardly and above buff. Body buff. Primaries buff, thinly irrorated with dark grey scales; a dark point at base; inner and outer lines punctiform, light brown, indistinct; a brown point as orbicular; reniform large, outlined with greyish brown and partly filled with reddish-brown scales; subterminal thick, lunular, dark brown, interrupted by the veins; terminal black points. Secondaries brown, palest at base; a dark discal spot; fringe pale brownish. Underneath: primaries brown, secondaries buff; large discal spots; large subterminal brown spots between the veins most conspicuous on secondaries.

Expanse 35 millim.

*Hab.* Rio Janeiro.

*Rhosologia pantina.*

Palpi black, ridged above with brown. Body buff. Primaries buff; a minute black spot at base; inner and outer lines fine, reddish, minutely spotted with black on veins; inner line wavy, outer line incurved below vein 4; a black point as orbicular; reniform large, circled with black, filled in with buff and reddish-brown scales; subterminal reddish and black spots; terminal black points; fringe roseate. Secondaries: inner area and base yellowish, otherwise thickly irrorated with brown; an interrupted black terminal line; a dark discocellular mark; fringe roseate. Underneath buff; the primaries thickly irrorated with brown; large dark discal spots; a broad outer line, somewhat interrupted; black terminal points.

Expanse 27 millim.

*Hab.* Trinidad.



XV.—*Descriptions of Brazilian Coccidæ.*

By ADOLPH HEMPEL, S. Paulo, Brazil.

[Concluded from p. 72.]

## Genus PULVINARIA, Targ.

*Pulvinaria ficus*, Hempel.

Dr. F. Noack, formerly of Campinas, told me that he had found *Pulvinaria psidii*, Maskell, at Campinas and São Paulo on the leaves of *Psidium* sp., and specimens in our collection, also on *Psidium*, were identified as such. A closer study of the specimens, however, shows that they do not agree with the description and figures of *P. psidii*, Maskell. The specimens are here described as a new species.

Adult female before gestation elliptical or oval, depressed, yellowish brown; derm slightly wrinkled near the margin. Anal lobes dark brown; anal cleft scarcely 1 millim. long. Length 5 millim.; width 2.25 millim. Ovisac white, homogeneous, oval, convex: length with dried and shrivelled animal 5 millim.; width 3.25 millim.; height 2 millim. The wax of ovisac is fluffy and adheres firmly to anything it touches. The insect begins to secrete the ovisac by first secreting a soft fringe of white wax around the entire margin of the body. Boiled in a solution of KOH it imparts to the liquid a light straw-colour. The derm becomes soft and transparent.

Antennæ variable, of eight joints, all bearing hairs; joints 2 and 5 each bearing one very long one. Occasionally an individual will be found with only seven joints to the antennæ. Length .425–.540 millim. Length of joints: (1) 48–53, (2) 66–70, (3) 97–110, (4) 53–70, (5) 53–79, (6) 31–48, (7) 31–44, (8) 48–66. Approximate formula: 3 (5 2 4) 8 1 (6 7). Legs long; trochanter with a very long hair; tarsus slightly curved. Length of joints of first pair of legs: coxa 156, trochanter and femur 326, tibia 267, tarsus 120, claw 31, digitules of claw 62. Tarsal digitules short, slender, with tips slightly expanded; digitules of claw large, with widely expanded ends. Rostrum ordinary, situated between the first pair of legs; rostral loop extending beyond the second pair of legs. Anal plates small, triangular, the antero-lateral side shorter than the postero-lateral. Anal ring with eight hairs. Around the lateral margin of the body there is a thickly-set row of short hairs, with tuberculate bases, and

flattened, expanded, and fringed ends. The abdomen bears several long hairs in front of the anal plates and between the antennæ, four of those between the antennæ being very long and characteristic. Each stigmatal area is characterized by a group of three spines, two very short and one long and curved, and by a double row of thirty to thirty-five small round spinnerets. On the dorsal surface there is a sub-marginal row of eleven to twelve small cone-shaped glands. The ventral surface bears many small glands and large round spinnerets in the anal region; on the dorsum there are some minute hairs.

*Hab.* São Paulo; on the upper and under sides of leaves and twigs of *Ficus* sp., *Psidium* sp., *Mangifera* sp. (mango), and *Ixora coccinea*. Many individuals will cluster on the leaves and twigs, causing considerable damage, especially to shade-trees in some parts of the city.

*Pulvinaria eugeniæ*, Hempel.

Adult female before gestation oval or elliptical in outline; dorsum shiny, slightly roughened by gland-pits, not very convex; light brown in colour, with a yellow longitudinal median stripe. The segments of the body are indicated by shallow transverse furrows and fine lines of dark brown. Some individuals show two dark brown eye-spots in the cephalic region. Beneath light yellow. Size 3-4.5 millim. long, 2-3 millim. wide, and 1 millim. high. After gestation the insect becomes yellow and shrivels. Ovisac white, closely felted, straight or slightly curved, a little wider at the distal end than at the end where the insect is; transversely striated, with two longitudinal ridges, dividing it into three subequal areas, the middle one being slightly elevated. Length 5.25-7.50 millim.; width 2-2.25 millim.; height 1 millim. Before gestation the insects usually infest the branches and twigs; but the ovisacs are almost invariably placed on the undersides of the leaves. One individual secreted an ovisac 7.25 millim. in length in nineteen days. Boiled in a solution of KOH it colours the liquid light yellow. The derm becomes soft and transparent.

Antennæ variable, usually of eight joints, all bearing hairs. Sometimes but seven joints are present. Length .321-.395 millim. Length of joints: (1) 44-53, (2) 44-57, (3) 66-70, (4) 40-57, (5) 35-48, (6) 24-31, (7) 24-31, (8) 44-48. Approximate formula 3 (2 1 4 8 5) (6 7). Legs ordinary; trochanter with a long hair. Length of joints of first pair of legs: coxa 110, trochanter and femur

209, tibia 156, tarsus 79, claw 26, digitules of claw 48. Tarsal digitules long, with slightly expanded ends; digitules of claw large, ends round and expanded. Rostrum situated between the first pair of legs; rostral loop extending to the second pair of legs. Anal plates small, the antero-lateral side shorter than the postero-lateral. Anal ring with six hairs. Around the lateral margin of the body there is a row of long hairs, flattened and fringed at the ends, set rather wide apart, and within this another row of shorter jointed hairs. Each stigmatal area is characterized by two very short spines and one very long one, curved, and by a double row of thirty to fifty round spinnerets extending to the spiracle. The ventral surface bears a group of about one hundred round spinnerets around the genital opening, as well as many small glands. It also bears a double row of six long hairs in front of the genital opening and four long and several shorter hairs between the antennæ and rostrum.

*Larva* (just hatched).—Small, elliptical, light yellow; margin slightly serrated, and bearing a few very short hairs. Abdomen ends in two plates, each with a long terminal seta. Stigmatal areas characterized by one stout spine. Antennæ apparently of six joints, of which 3 and 6 are about equal. Legs short; tarsal digitules long and slender. Digitules of claw shorter, of unequal size, ends expanded; claw long, slender, slightly curved. Rostral loop long, extending to the anal plates. Length .356 millim.; width .244 millim.

*Hab.* Ypiranga and São Paulo. On *Eugenia jaboticaba* and other shrubs of the order Myrtaceæ. The leaves and twigs infested by this species are usually covered with a black fungus.

#### *Pulvinaria depressa*, Hempel.

Adult female brown, with a light yellow median stripe; elliptical, flat, surface wrinkled by slight ridges radiating from the central stripe; these ridges are darker than the rest of the derm. Below whitish. The dorsal surface is usually covered with particles of wax, thus giving it a white appearance. Length 3.5 millim.; width 2 millim. Ovisac white, flat, smooth, sides parallel; no ridges or grooves. Length 7 millim.; width 2 millim. Boiled in a solution of KOH the derm becomes soft and transparent.

Antennæ variable, of eight joints, all bearing hairs. Length .346-.391 millim. Length of joints: (1) 35-44, (2) 44-53, (3) 70-79, (4) 44-53, (5) 48, (6) 31-35, (7) 26, (8) 48-53. Legs ordinary; length of joints of first pair of

legs : coxa 79, trochanter and femur 231, tibia 156, tarsus 89, claw 24, digitules of claw 48. Tarsal digitules long, with slightly expanded ends; digitules of claw large, with ends round and expanded. Rostrum situated between the first pair of legs; rostral loop hardly extending to the second pair of legs. Anal plates small, the antero-lateral side a little longer than the postero-lateral. Anal ring with eight hairs. Around the lateral margin of the body there is a simple row of long pointed hairs, rather closely set. Each stigmatal area is characterized by two large flat spines and one longer one, and by a double row of about thirty spinnerets extending to the spiracle. The derm on the abdomen bears some tubular glands.

*Hab.* Ypiranga. On the underside of the leaves of *Miconia* sp. Not common.

*Pulvinaria grandis*, Hempel.

Adult female oval to elongate in outline; dorsum convex, highest behind the middle; orange-yellow in colour. Anal plates very small, dark brown. Two small black eye-spots are situated on the lateral anterior margin. Length 6 millim.; width 4.5 millim.; height 2.5 millim. Ovisac dirty white, long, convex, usually curved, loosely woven, with one prominent white zigzag median ridge. Loose cotton fibres, resembling spider-webs, extend the whole length of the dorsum. Length 19.5 millim.; width 3.75 millim.; height 2.50 millim. One individual constructed 3.5 millim. of ovisac in one day. The cotton is loose and adheres to anything it touches. Boiled in a solution of KOH it colours the liquid light yellow. The derm becomes soft and transparent.

Antennæ variable, of eight joints, all of which bear hairs. Length .531-.564 millim. Length of joints: (1) 70-75, (2) 79-83, (3) 114-120, (4) 79-93, (5) 66, (6) 40-44, (7) 35, (8) 48. Approximate formula: 3 4 2 1 5 8 6 7. Legs long; tarsus slightly curved. Length of joints of first pair of legs: coxa 133, trochanter and femur 404, tibia 276, tarsus 123, claw 40, digitules of claw 75. Tarsal digitules not very long, slender, with ends but little expanded. Digitules of claw of unequal length, narrow, with ends round and expanded. Rostrum situated between the first pair of legs; rostral loop short, extending a little more than halfway to the second pair of legs. Anal plates small, triangular, the antero-lateral side longer than the postero-lateral. Anal ring with ten hairs. The lateral margin of the body bears a double row of very short sharp hairs. Each stigmatal area



is indented on the margin and bears two to four very small spines and one larger one, and has a double row of forty-five to sixty small round spinnerets extending to the spiracle. The ventral surface bears a double row of long hairs between the last pair of legs and the genital opening and four long hairs between the antennæ. The abdomen bears many small tubular glands, and numerous large round spinnerets are grouped about the genital opening.

*Larva* (just hatched).—Elliptical, light yellowish brown. Antennæ of six joints, joints 3 and 6 longest and about equal in length. Legs slender, all the digitules fine, with slightly knobbed ends. Margin of the body finely serrated, with a few minute hairs. Each stigmatal area bears one short, blunt, curved spine. Each anal plate bears a long terminal seta. Rostral loop extending to the anal cleft. Eyes small, conical, dark brown. Length .453 millim.; width .276 millim.

*Hab.* Ypiranga. On twigs and leaves of *Illyrica* sp. and other plants of the order Myrtaceæ. Rare.

#### Genus LICHTENSIA, Sign.

##### *Lichtensia argentata*, Hempel.

Ovisac, covering the adult female, curved, 8.5 millim. long, 4.25 millim. wide, and 1.50 millim. high. The inside is a white, loose, cottony structure that adheres to objects that it touches; over this is a thin covering of cream-coloured closely felted material, which in turn is covered by a very thin layer of glassy secretion, giving the sac a shiny silver-grey appearance. Adult female elliptical, orange, posterior end of body light yellow and wider than the anterior end. Length, after boiling in a solution of KOH, 6 millim.; width 3.5 millim. The derm becomes soft and transparent.

Antennæ variable, of eight joints, all but joints 3 and 4 bearing hairs. Length .519–.556 millim. Length of joints: (1) 48–57, (2) 66, (3) 141–146, (4) 75–84, (5) 53–64, (6) 48, (7) 35–40, (8) 53. Approximate formula: 3 4 2 (5 1 8) 6 7. Legs long. Length of joints of first pair of legs: coxa 156, trochanter and femur 364, tibia 244, tarsus 110, claw 31, digitules of claw 53. Tarsal digitules very long, with expanded ends. Digitules of claw short, trumpet-shaped, with the ends obliquely truncated and widely expanded. Rostrum situated between the first pair of legs; rostral loop short, not extending halfway to the insertion of the second pair of legs. Anal cleft short, scarcely .75 millim. long. Anal plates triangular, each with six short hairs, the antero-lateral side shorter than the postero-lateral. Anal ring with ten hairs.

Around the lateral margin of the body there are two rows of spines: one consists of large stout blunt spines, about .044 millim. long, placed regularly at intervals exceeding the length of the spines; the other consists of smaller, thinner, spine-like hairs, placed irregularly. Each stigmatal area is characterized by three or four longer spines with curved ends and twenty to thirty small round spinnerets. On the dorsal surface near the posterior margin there are five small pyriform glands, two on one side and three on the other; near the anterior margin there are also five of these glands. The dorsal derm also bears numerous fine filamentous glands. The abdomen bears many round spinnerets grouped about the genital opening and a double median row of long hairs.

*Hab.* Ypiranga. On the upperside of leaves of a tree of the order Ilicinæ.

*Lichtensia ? attenuata*, Hempel.

Adult female scale waxy, white, elliptical, smooth; dorsum slightly convex, ends rounded, the caudal end with a short incision. The scale is apparently composed of four plates—one dorsal, one lateral on each side, and one terminal anterior. The dorsal and lateral plates are narrow and elongate; the anterior plate is small and more or less triangular in shape. The wax is thin, hard, and tough. The insect is crowded in the anterior end of the scale, the remaining space being occupied by the eggs. Length 6 millim.; width 3 millim.; height 1.50 millim. Adult female, boiled in a solution of KOH the derm becomes soft and transparent, except a narrow marginal strip, which is chitinized. The body is oval; posterior end attenuate, the anal cleft is very wide, the body thus ending in two conspicuous points. Length 4 millim.; width 2.25 millim.

Antennæ variable, of eight joints, all but joint 3 bearing hairs. Length .385-.423 millim. Length of joints: (1) 40-44, (2) 53-57, (3) 84-89, (4) 62-75, (5) 53, (6) 31-35, (7) 22-26, (8) 40-44. Approximate formula: 34(25)(18) 67. Legs ordinary; trochanter and coxa each with a long hair. Length of joints of first pair of legs: coxa 89, trochanter and femur 182, tibia 110, tarsus 102, claw 22, digitules of claw 35. Tarsal digitules very long, with slightly expanded ends; digitules of claw unequal in size, ends round and expanded. Rostrum situated between the first pair of legs; rostral loop extending to the second pair of legs. Anal plates small, the antero-lateral side shorter than the postero-lateral. Anal ring with ten hairs. The lateral margin of the body bears a row

of numerous short thick spines and a few short hairs. Each stigmatal area is characterized by three or four flattened spines and twenty to twenty-five small round spinnerets. The dorsal surface bears a submarginal row of about twenty-six of the peculiar pyriform glands, as in the preceding species. The abdomen bears a group of round spinnerets about the genital opening, while the derm of both surfaces bears numerous large tubular glands.

*Hab.* Ypiranga. On the stems of *Baccharis genistelloides*, var. *trimeræ*, Baker. Many individuals are infested with a small hymenopterous parasite. Not common.

This species is placed in this genus provisionally; perhaps it would more properly belong to *Ceroplastodes*, Ckll.

### Subfamily *DIASPINÆ*.

#### Genus *ASPIDIOTUS*, Bouché.

##### *Aspidiotus (Odonaspis) janeirensis*, Hempel.

Adult female scale elongate, white, the posterior end rounded. Pellicles light yellow, placed on the extreme anterior end. Ventral scale thick, with the dorsal scale forming a complete sac which encloses the insect. Length 3.50 millim.; width 1.25 millim.

Adult female oval, pink, 1.770 millim. long and 1.230 millim. wide. The pygidium is thick, light brown, and chitinized, and is differentiated into five plates, the median longest, narrowest, and three-lobed, the others irregularly notched and toothed. The lateral margin of the two segments, just preceding the pygidium, is also chitinized and plate-like. On both the dorsal and ventral surfaces, between the abdominal segments, are what appear to be narrow chitinous bands, but in reality are narrow rows of small glands or spinnerets. There are three groups of circumgenital glands present, forming nearly a continuous arched row. The anterior group consists of about twenty-seven glands and the lateral groups of about one hundred and six glands each. Around each anterior spiracle there is a group of about forty-five spinnerets, and around each posterior spiracle a group of about thirty-six spinnerets. The derm is thin and transversely striated. The antennæ are present as minute tubercles with one hair. The margin of the pygidium and the other abdominal segments bear many small glands. Rostrum very large. Anal orifice situated just behind the anterior group of spinnerets.

*Hab.* On the Ilha das Flores, in the Bay of Rio de Janeiro. Collected about the joints of grass and covered by the leaf-sheath.

*Aspidiotus (Chrysomphalus) paulistus*, Hempel.

Female scale circular, flat, brownish black, covered with a grey or light brown secretion. Pellicles blackish, placed centrally or slightly to one side, and covered with a small nipple-like mass of secretion. Diameter about 2·50 millim.

Male scale of same colour and shape as that of the female. Diameter 1·50 millim.

Adult female ovate. Pygidium with three pairs of lobes, slightly wider than long, subequal in size, the median pair being a trifle wider than the others, with the edges slightly indented. There are four very long and conspicuous thickenings of the body-wall at the base of the lobes and several shorter ones. The lateral edges of the pygidium are thick and chitinous laterad of the last pair of lobes and present four or five sharp-pointed lobes with serrated edges. Between the median lobes and the median and second pair of lobes there are two deeply incised plates; between the second and third pair of lobes and laterad of the third pair of lobes there are two deeply incised plates and one simple one. Four groups of circumgenital glands are present, the anterior laterals varying from six to ten, the posterior laterals from three to seven. The anal orifice is close to the posterior lateral groups. Numerous very long slender tubular glands are borne by the pygidium, and a few are also borne by the other abdominal segments. The antennæ are present as short tubercles with one stout curved hair. The posterior edge of the cephalothorax is on each side modified into a short hump or tubercle, but does not bear a horn or spine. The derm is transversely striated and bears a few hairs. Length 1·90 millim.; width 1·50 millim.

Adult male light yellow, with a narrow dark band across the thorax. Thorax long; segments of the abdomen shrivelled. Antennæ of ten joints; joints 1 and 2 short; all joints bear many hairs; joint 10 apparently with one or two knobbed hairs. Legs long, hairy; claw very long and thin, with digitules extending beyond the tip. Tarsal digitules not extending to the tip of claw. Wings ordinary; halteres present. Genital spike long, thin, sharp, ·400 millim. long. Total length, including genital spike, ·950 millim.; width ·350 millim.

*Larva* (just hatched).—Small, orange, elliptical, flat, about ·275 millim. long and ·150 millim. wide.

*Hab.* Ypiranga and São Paulo. On the leaves of *Laurus* sp. and other cultivated and uncultivated bushes.



## Genus PSEUDISCHNASPIS, Hempel.

The adult female scale brown, flat, long and narrow, with a superficial resemblance to *Ischnaspis*. Pellicles orange, not overlapping, placed at the extreme anterior end of the scale. Male scale similar in shape and structure to that of the female, but much shorter. The pygidium of the adult female has three well-defined lobes and body-thickenings, as in *Chrysomphalus*. Four groups of circumgenital glands are present. No reticulated area on the dorsum of the pygidium.

Type *Pseudischnaspis linearis*, Hempel.

*Pseudischnaspis linearis*, Hempel.

Female scale elongate, narrow, flat; sides parallel; the posterior end sometimes obliquely truncated; dark brown in colour. The pellicles are orange in colour and are placed at the anterior end. The first pellicle is darker than the second, with a small central ring on the dorsum. Length 2-3 millim.; width .75 millim.

Male scale lighter in colour, but of the same texture and shape as the female scale. Length 1.25 millim.; width .50 millim.

Adult female elongate, flat, white; pygidium with three pair of well-developed lobes, the median pair narrowest, the third pair the widest. The posterior edge of the median pair is entire or slightly notched, but the edge of the second and third pair is serrated. There are six pair of elongate thickenings of the body-wall at the base of the lobes, arranged in the following manner:—the median pair short, the next long, the next short, the next longer, the next long, and the last short. Between the median lobes there is a deeply incised bifid plate; between the median and second pair of lobes there is a deeply incised plate; between the second and third pair of lobes there are two plates and one hair, and laterad of the third pair of lobes there are two or three plates and one hair. The lateral margin is chitinized and notched and serrated laterad of the third pair of lobes. Four pair of circumgenital glands are present. The anterior laterals vary from six to eight, the posterior laterals from four to seven. The anal orifice is situated on a plane between the posterior groups of glands. The pygidium bears numerous long, fine, tubular glands. Some of these glands are also found on the other abdominal segments. The antennæ are present as small tubercles with a long curved hair. The derm is transversely striated, and bears a few hairs.

*Larva* (just hatched).—Flat, ovate, light yellow, .262 millim. long and .178 millim. wide. Antennæ long, slender, wrinkled as in *Aspidiotus*. Legs short. The sides of the abdomen are notched; the derm is transversely wrinkled. The median pair of abdominal lobes are wide, large, and serrated. The abdominal setæ are short.

*Hab.* Ypiranga, State of S. Paulo. On the upperside of leaves of *Myrcia* sp. Usually placed along the midrib of the leaf.

### Genus DIASPIS, Costa.

#### *Diaspis australis*, Hempel.

Scale of adult female white, opaque, oblong to subcircular in outline, very convex, about 2.75 millim. long. Pellicles light brown, usually exposed, placed near the margin.

Male scale white, narrow, unicarinate, forming a complete sac, inflated anteriorly and depressed posteriorly. Pellicle light brown. Length 1.50 millim.

Adult female yellowish, the posterior end of the abdomen light brown; oval, widest anteriorly, the three segments before the pygidium produced laterally. Pygidium with three pair of lobes; the median pair wide apart, large, the inner margins diverging, and entire or slightly crenulated, the outer margins partly united with the body-wall. The second pair short and usually bilobed, but sometimes trilobed. The third pair bilobed. There are also two pair of short tooth-like projections laterad of the third pair of lobes. There is one large plate with incised end on each side, between the first and second lobes, one between the second and third lobes, and two or three laterad of the third lobes; aside from these there are also about twenty simple cone-like plates on each side. The segment next to the pygidium bears about twenty-two of these plates on each side, and the next segment bears about ten. Between the median lobes there are two sharp hairs. The pygidium and the other abdominal segments bear numerous large and small tubular glands. The circumgenital glands are present in five groups, the anterior median varying from fifteen to twenty-eight, the anterior laterals from seventeen to forty-five, and the posterior laterals from seventeen to thirty-two. About each spiracle there are twenty to twenty-five round spinnerets. The derm is transversely striated and bears a few short hairs. The antennæ are present as small tubercles with one hair.

*Hab.* Ypiranga, State of S. Paulo. On the twigs of a bush of the order Myrtaceæ.

## Genus DIASPIDISTIS, Hempel.

Female scale subcircular; pellicles central, superimposed as in *Aspidiotus*. Circumgenital glands in four groups. Pygidium of adult female with a continuous marginal series of lobes.

Male scale white, forming a complete sac, convex, not carinate, but the surface roughened by small nodules of secretion. Pellicle placed more or less centrally.

Type *Diaspidistis multilobis*, Hempel.

*Diaspidistis multilobis*, Hempel.

Scale of adult female subcircular, somewhat convex, light brown in colour; the ventral scale a very thin film. Diameter about 2·30 millim. Pellicles chrome-yellow, central, superimposed, usually exposed.

Male scale white, more or less elongate; not carinate, but the surface roughened by nodules of secretion. Pellicle light yellow, with a longitudinal dorsal ridge; more or less centrally placed. Length of scale 1·50 millim.

Adult female cordate to subcircular in outline, the anterior margin being always notched in the middle. Pygidium with about thirty-six lobes or lobe-like processes; the median pair of lobes is the largest and has the margin notched. The other lobes have the margin either entire or slightly serrated. All lobes have faint longitudinal striations. Three pair of simple sharp plates and three pair of gland-papillæ or projections are also present. The three segments preceding the pygidium have the lateral margins produced. The pygidium and other segments bear numerous tubular glands. Four groups of circumgenital glands are present. The anterior laterals vary from fifteen to twenty-eight, the posterior laterals from eighteen to twenty-seven. The anal orifice is on a level with the posterior groups of glands. The derm is conspicuously transversely striated. The antennæ are present as small tubercles with three hairs. There are ten or twelve round spinnerets about the orifice of the first pair of spiracles. Diameter 90-110 millim.

Adult male small, light yellow, the thoracic band of the same colour. Antennæ 870 millim. long, of ten joints, all of which bear many hairs; the last joint apparently with one knobbed hair. Body elongate; genital spike long and thin. Legs not very long; all the joints bear many hairs, but more especially the tarsus, which is thickly set with long hairs. Claw fine and slender; both digitules of claw and the tarsal digitules but slightly longer than claw. Wings rather

long. Halteres present. Length of body, including genital spike, .890 millim.; length of genital spike .265 millim.

*Hab.* Ypiranga, State of S. Paulo. On a bush of the order Myrtaceæ. The females are found on the upperside of the leaves, but the male scales are usually clustered along the midrib on the underside of the leaves.

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XVI.—*On a small Collection of Butterflies from the Kikuyu Country and Mombasa made by the Rev. K. St. Aubyn Rogers.* By ARTHUR G. BUTLER, Ph.D.

IT will be remembered that in the 'Annals' for January last I published an account of a collection of butterflies made by Mr. Rogers between Mombasa and the Forests of Taveta, and that therein I called attention to certain species which were either new to the Museum collection or of which we required additional examples.

Mr. Rogers has now sent some of the specimens asked for, together with a series of butterflies collected by him last year in the Kikuyu country, which is especially interesting as supplementing my paper upon Mr. Crawshay's collections recently published in the 'Proceedings of the Zoological Society.'

The present consignment from Mr. Rogers consists of fifty-six species, some of which are of considerable rarity in collections; the following are of especial importance to us:—Both sexes of *Precis Westermanni* (in two pairs); *Axiocerses punicea*, new to the Museum; the female of *Virachola dariaves*, which was also new to the general collection—of this species Mr. Rogers observes that he has only once come across it, "at a place about 14 miles up the creek, where it was quite common," so that he did not trouble much about it; *Uranothauma cordatus* and *Falkensteini*; *Cyclyreus Sharpie*; *Mylothris rubricosta* and the female of *M. Jacksoni*, which was new to us; a pair of *Terias regularis* (no. 250), which we have not received commonly from Eastern Africa; *Teracolus Rothschildi* in both sexes; a male of *T. castalis*; a beautiful and very lightly magenta-spotted male of *T. elgonensis* (214), of which we previously only possessed the worn male collected by Mr. Crawshay; *Belenois margaritacea*, of which we previously only had one example; females of *Papilio Macinnoni* and *Jacksoni*; an example of what I believe to be *Sarangesa ophthalmica*, and which is new to the Museum. No new species were obtained, but a list of the species with



their dates of capture would, I think, be useful, as adding to our knowledge of the geographical distribution of African butterflies, and therefore I append it.

*List of Species.*

- Amauris albimaculata*, Butl. Kikuyu, 17th and 20th December.  
*Neocænura Gregorii*, Butl. Kikuyu, 10th October.  
*Precis cebrene*, Trim. Kikuyu, 1st December.  
 — *Westermanni*, Westw. Kikuyu, 10th, 11th, and 12th December.  
*Hypanartia hippomenes*, Hübn. Kikuyu, 12th December.  
*Pyrameis abyssinica*, Feld. Kikuyu, 12th and 17th December.  
*Neptidopsis fulgurata*, Boisd. Mombasa, 3rd November.  
*Eurytela dryope*, Fabr. Kikuyu, 19th December.  
*Acreea perrupta*, Butl. Mombasa, 19th November.  
 — *Doubledayi*, Guér. Nyale, 14th September.  
 — *neobule*, Doubl. Kikuyu, 22nd December.  
*Axiocerses punicea*, Gr.-Sm. Nyale, 14th September.  
*Virachola dariaves* ♀, Hewits. Mombasa, 4th October.  
*Epamera pallene*, Wallgr. Mombasa, 16th November.  
*Lycæsthes lemnos*, Hewits. Kikuyu, 12th and 14th December.  
*Uranothauma cordatus*, Sharpe. Kikuyu, 20th December.  
 — *Falkensteini*, Dewitz. Kikuyu, 15th December.  
*Cacyreus lingeus*, Cram. Kikuyu, 24th December.  
*Cyclyreus Sharpæ*, Butl. Kikuyu, 20th December.  
*Zizera lucida*, Trim. Mombasa, 20th November.  
*Mylothris Rüppellii*, Koch. Kikuyu, 10th, 11th, 18th, 19th December.  
 — *rubricosta*, Mab. Kikuyu, 10th December.  
 — *Jacksoni* ♀, Sharpe. Kikuyu, 13th December.  
*Colias electo*, var. *edusa*, Fabr. Mombasa, 25th October; Kikuyu, 10th and 20th December.  
*Terias regularis* ♂ ♀, Butl. Mombasa, 24th October and 19th November.  
 — *hapale*, Mab. Kikuyu, 10th December.  
 — *senegalensis*, Boisd. Mombasa, 17th November.  
*Teracolus Rothschildi*, Sharpe. Mombasa, 20th October and 17th November.  
 — *castalis*, Staud. Mombasa, 26th October.  
 — *eris*, Klug. Kikuyu, 20th December.  
 — *elgonensis*, Sharpe. Kikuyu, 11th December.  
 — *imperator*, Butl. Mombasa, 18th, 19th, 23rd, and 25th October, 1st, 15th, 19th, and 22nd November; Kikuyu, 11th December.  
 — *antevippe*, Boisd. Mombasa, 15th and 17th November.  
 — *garisa*, Wallgr. Mombasa, 7th and 22nd November; Kikuyu, 11th, 15th, and 19th December.  
*Glutophrissa contracta*, Butl. Kikuyu, 15th December.  
*Belenois zochalia*, Boisd. Kikuyu, 10th, 17th, 20th, and 22nd December.  
 — *mesentina*, Cram. Mombasa, 22nd November.  
 — *margaritacea*, Sharpe. Kikuyu, 12th December.  
*Synchlœa Johnstonei*, Crowley. Kikuyu, 14th December.  
*Leuceronia Buquetii*, Boisd. Mombasa, 17th November.  
*Papilio Mackinnoni*, Sharpe. Kikuyu, 12th December.  
 — *nireus*, Linn. Kikuyu, 12th and 22nd December.  
 — *lyceus*, Doubl. Kikuyu, 12th December.  
 — *phorcas*, Cram. Kikuyu, 12th and 14th December.  
 — *cenea*, Stoll. Kikuyu (escarpment), 13th December.  
 — *Jacksoni*, Sharpe. Kikuyu, 12th December.

- Sarangesa ophthalmica* ♀, Mab. Nyale, 14th September.  
*Eretis lugens*, Rogenh. Kikuyu, 10th and 19th December.  
*Pyrus sataspes*, Trim. Mombasa, 20th November.  
 — *machakosa*, Butl. Mombasa, 19th November.  
 — *spio*, Linn. Kikuyu, 10th and 20th December.  
*Gomalia elma*, Trim. Mombasa, 10th November; Kikuyu, 22nd December.  
*Cyclopides midas*, Butl. Kikuyu, 11th December.  
 — *quadrisignatus*, Butl. Kikuyu, 10th, 11th, and 18th December.  
*Padraona zeno*, Trim. Kikuyu, 10th and 12th December.  
*Gegenes Letterstedti*, Wallgr. Kikuyu, 19th December.
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## XVII.—On a new Bat from Borneo.

By R. SHELFORD, M.A., Curator of the Sarawak Museum.

*Hipposiderus Covi*, sp. n.

Size small. Nose-leaf large and complicated in form; front surface of the posterior leaf divided into four cells by three vertical septa, of which the central is narrow and the cells on each side of it of considerable size, whilst the two lateral septa are very broad and the two outer cells much reduced in size; upper margin of posterior nose-leaf folded back on itself; sella broad, divided into a central thickened portion with a median longitudinal ridge and two lateral triangular lappets; anterior nose-leaf or horseshoe very large, completely hiding the muzzle when viewed from above, its anterior border projecting beyond the upper lip. Two secondary cutaneous leaflets, the upper continuous round the end of the muzzle, the lower consisting of two short and separate parts. No frontal gland in the female. Ears large, reaching slightly beyond the tip of the muzzle when laid forwards, their tips subacute; anterior margins slightly concave, posterior margins concave below the tips, then convex. Wings from the metatarsi. Tip of the tail projecting slightly beyond the interfemoral membrane. Colour (in spirit) dark uniform brown.

*Dentition*.—Minute first upper premolar present, in the outer angle formed by the approximated upper canine and second upper premolar.

Dimensions of the type (an adult female in spirit) in millimetres:—

Forearm 53.

Head and body 51·5; tail 26; head 21·5; nose-leaf  $13 \times 10$ ; ear 16·5; calcar 11.

*Hab.* Mount Penrisen, Sarawak, Borneo, 4200 feet.

Type in British Museum. Registered number 1. 6. 23. 1.

One example only was captured as it emerged with some specimens of *Rhinolophus luctus* (Temm.) from the mouth of a cave.

I have much pleasure in naming this species, which by its very large and complicated nose-leaf differs from all other forms known to me, after Mr. E. A. W. Cox, of the Sarawak Service, to whom I am indebted for the unique specimen.

XVIII.—*Description of a new Fish of the Family Cichlidæ from the French Congo.* By G. A. BOULENGER, F.R.S.

*Pelmatochromis Batesii.*

Teeth in 3 to 5 series in each jaw, outer largest. Depth of body  $2\frac{1}{2}$  to  $2\frac{2}{3}$  times in total length, length of head 3 times. Snout broad, rounded, with straight profile, longer than the diameter of the eye, which is contained 4 times in length of head and 1 to  $1\frac{1}{4}$  in interorbital width; maxillary not reaching quite to below anterior border of eye; 4 series of scales on the cheek; large scales on the opercle. Gill-rakers short, 10 or 11 on lower part of anterior arch. Dorsal XV 10–11; spines increasing in length to the last, which measures  $\frac{2}{5}$ , or a little less than  $\frac{2}{5}$ , the length of the head; middle soft rays much produced, nearly as long as the head. Pectoral about  $\frac{2}{3}$  length of head. Ventral produced in a filament, reaching origin of anal or beyond. Anal III 8; third spine as long as but stronger than last dorsal. Caudal rounded. Caudal peduncle deeper than long. Scales smooth, with fine concentric striation, 27–28  $\frac{2\frac{1}{2}}{9-10}$ ; lat. l.  $\frac{18-19}{8-9}$ . Dark olive-brown above, yellowish beneath, with very indistinct traces of darker cross-bars; a black or steel-blue opercular spot; fins greyish, soft dorsal, anal, and caudal with small blackish spots; outer rays of ventrals blackish.

Total length 120 millim.

Three specimens from the Benito River, collected for the British Museum by Mr. G. L. Bates.

This new species is most nearly related to *P. ocellifer*, Blgr., from the Congo, and *P. Ansorgii*, Blgr., from the Niger Delta. It differs in the longer snout and in the length of the dorsal spines, the middle spines not measuring more than  $\frac{1}{3}$  the length of the head.

In 1898 I gave a synopsis\* of the seven species of this genus then known to me. As the number has now risen to thirteen it is advisable to publish a new key to their identification:—

- I. 6 or 7 series of teeth in the jaws; D. XIV 11–12; pectoral nearly as long as head; caudal emarginate; sq. 26–27  $\frac{3-3\frac{1}{2}}{8-10}$  ..... 1. *P. Buettikoferi*, [Stdr.]
- II. 2 to 5 series of teeth in the jaws.
- A. Lower lateral line at least nearly as long as upper; pectoral at least as long as head; caudal truncate or emarginate.
- D. XIII–XIV 16–17; sq. 38–40  $\frac{5-6}{3}$ ; lat. l.  $\frac{28-32}{26-28}$  . 2. *P. Jentinki*, [Stdr.]
- D. XV–XVI 14–15; sq. 55–58  $\frac{6-7}{3}$ ; lat. l.  $\frac{25-31}{47-48}$  .. 3. *P. polylepis*, [Blgr.]
- D. XIV–XVI 12–14; sq. 31–36  $\frac{4-5}{2}$ ; lat. l.  $\frac{21-27}{25-31}$  . 4. *P. lateralis*, [Blgr.]
- B. Lower lateral line short, confined to the caudal region.
1. D. XIII 11; pectoral as long as head; sq. 28–30  $\frac{4}{11}$ ; lat. l.  $\frac{18-21}{10}$  ..... 5. *P. congicus*, Blgr.
2. D. XIV–XVI 8–11; pectoral  $\frac{3}{8}$  to  $\frac{5}{4}$  length of head.
- a. Caudal truncate or rounded-subtruncate; snout much longer than diameter of eye; maxillary not extending to below anterior border of eye. [Blgr.]
- Sq. 32  $\frac{3\frac{1}{2}}{9}$ ; 5 series of scales on cheek ..... 6. *P. Welhvitshii*,
- Sq. 29–31  $\frac{2\frac{1}{2}}{10}$ ; 3 or 4 series of scales on cheek .... 7. *P. Guentheri*, [Sauv.]
- b. Caudal rounded or rounded-subacuminate; sq. 26–29  $\frac{2-3}{9-11}$ .
- a. Snout longer than diameter of eye; maxillary not extending quite to below anterior border of eye; last dorsal spine longest; 4 series of scales on cheek ..... 8. *P. Batesii*, Blgr.
- $\beta$ . Snout not longer than eye.
- \* Dorsal spines subequal from the fifth.
- Maxillary extending to below anterior border of eye; 3 series of scales on cheek; dorsal spines rather more than  $\frac{1}{2}$  length of head ..... 9. *P. ocellifer*, [Blgr.]
- Maxillary not extending to below anterior border of eye; 3 or 4 series of scales on cheek; dorsal spines not quite  $\frac{1}{2}$  length of head ..... 10. *P. Ansorgii*, [Blgr.]
- Maxillary extending to below anterior border of eye;



- 2 or 3 series of scales on cheek; dorsal spines  
 about  $\frac{1}{3}$  length of head ..... 11. *P. subocellatus*,  
 \*\* Last dorsal spine longest; maxillary [Gthr.  
 not extending to below anterior  
 border of eye; 2 or 3 series of scales  
 on cheek ..... 12. *P. pulcher*, Blgr.  
 3. D. XVIII 7; pectoral  $\frac{4}{5}$  length of head;  
 caudal rounded; 2 series of scales on [Blgr.  
 cheek ..... 13. *P. tieniatus*,

XIX.—*Descriptions of Three new Genera and Seven new Species of Hymenoptera from Eastern Asia and Australia.*  
 By P. CAMERON.

ANTHOPHILA.

CTENOAPIS, gen. nov.

The longer joint of the four posterior calcaria pectinated; the spurs bifid; the teeth unequal in length. Labrum deeply or moderately deeply incised in the middle at the apex. Mandibles unidentate. Radial cellule not quite so long as the two cubital cellules together; it is indistinctly appendiculated at the apex, which is moderately acutely pointed. There are two cubital cellules; the second receives both the recurrent nervures; it is narrowed at the top, being there about one third of its length on the lower side. Trophi long, the maxillary palpi?, the labial?-jointed. Antennæ stout; the basal joints of the flagellum broader than long, the apical longer than broad. Eyes long, parallel, reaching near to the base of the mandibles. Ocelli in a curve [..].

The body is only moderately pilose. The legs are stout; the hinder femora, tibiæ, and metatarsus are thickened; the recurrent nervures are received near the transverse cubitals; the transverse basal nervure is interstitial. In the female the hinder tibiæ and the metatarsus are thickly covered with long soft hair; the second and following ventral segments are fringed with long soft hair. The antennæ are placed above the clypeus and shortly below the middle of the eyes; the apical joint of the hinder tarsi is long and curved, longer than the middle three joints united. There is a short distinct longitudinal keel on either side of the mesonotum; the tegulæ are moderately large; there is no area on the base of the median segment; the face and clypeus are bare and flat.

The general form of this genus is somewhat like *Panurgus*, but it cannot readily be confounded with that genus. The

pectinated spurs and tarsi are pretty similar to those of *Ctenoplectra*, but that genus may be known from it by the labrum not being incised, by the transverse median nervure being received distinctly behind the transverse basal, and not interstitial as in the present genus. The two species I have included in *Ctenoapis* are very dissimilar in appearance. I have not a spare specimen to run any risk with to dissect for an examination of the trophi.

*Ctenoapis lutea*, sp. n.

Lutea, albo pilosa; alis hyalinis, stigmatibus luteo, nervis fuscis. ♀. Long. 5 mm.

*Hab.* Ferozopore, Punjab (*Major C. S. Nurse*).

The lower orbits and the clypeus are pale yellow and much lighter in tint than the rest of the head; the clypeus and front are sparsely punctured; the apical third of the mandibles is dark brownish. The scape of the antennæ is sparsely covered with pale hair; the flagellum is almost bare. The mesonotum and scutellum are almost bare; the pleuræ, sternum, and median segment are covered with white pubescence. Mesonotum sparsely punctured. Abdomen smooth and shining; the segments fringed with white soft hair. Legs coloured like the body; the four hinder femora are lined broadly with black; the teeth on the inner spur of the calcaria are stout. Wings clear hyaline; the stigma and nervures luteous; the nervures, if anything, darker in tint.

*Ctenoapis flavomaculata*, sp. n.

Nigra, dense albo pilosa; sterno, pleuris infra, facie clypeoque flavis; abdominis basi late flava balteata; pedibus flavis, dense albo pilosis; femoribus tibiisque posterioribus late nigris. ♂. Long. 7 mm.

*Hab.* Ferozopore, Punjab (*Major C. S. Nurse*).

Head black; the face, clypeus, labrum, the inner orbits above narrowly, the lower half of the outer entirely, yellow; the lower part of the front at the antennæ is thickly covered with long soft white hair, as is also the hinder region; the face and clypeus are sparsely covered with long pale hair. The apex of the mandibles broadly rufous. Abdomen black, above thickly covered with long soft white hair, as is also, but not quite so thickly, the sternum; the apical half of the median segment is broadly furrowed in the middle. The four hinder femora are broadly black above, the middle tibiæ are black behind; the hinder tibiæ are black except at the

base and apex; the apical four joints of the hinder tarsi are black. Abdomen black; a broad band near the apex of the basal segment, the second almost entirely, the third except for an interrupted black line at the apex and the apical segment, yellow; the basal ventral segments are for the greater part yellow.

## FOSSORES.

### CHRYSOLARRA, gen. nov.

Recurrent nervures appendiculated or touching each other. Inner eye-margins with folds. Mandibles with an incision near the base. Pronotum placed below the level of the dorsulum. Median segment as long as the mesonotum, rounded behind. Pedicle of antennæ pilose. Base of anterior femora not emarginate near the base. Anterior tarsi armed with stiff, moderately long spines. Ocellus broad, triangularly dilated in front. Pygidium covered with stiff bristles and with longish stiff hairs.

The presence of a fold on the inner eye-orbits separates this genus from *Tachytes* and *Tachysphex*; from *Notogonia* it may be known by the pygidium not being covered with a hoar-frost-like pubescence, but by a stiff pile and with longish stiff hairs. Characteristic is the fact that the recurrent nervures are united to each other, and not distinctly separated as in the other genera. The apical abscissa of the radius is oblique. In the hind wings the apical nervures are faint except the lower one. The legs are stout; the femora are distinctly narrowed towards the apex; the tarsi are longer and more slender than in *Tachytes*, the hinder are twice the length of the tibiæ; the metatarsus is twice the length of the second joint; the abdomen is also narrower and longer than in that genus. The pygidium is sharply margined. In the three known species the recurrent nervures are received near the apex of the basal third of the cellule. The eyes are large, reach near to the base of the mandibles, and converge towards the top. The hinder tibiæ are keeled behind. The pubescence on the four species is golden.

### *Chrysolarra appendiculata*, sp. n.

Nigra, capite mesonotoque dense aureo pilosis; abdomine aureo balteato; alis flavo-hyalinis, nervis flavis. ♀.  
Long. 22 millim.

*Hab.* Khasia Hills. Coll. Rothney.

Scape of antennæ on the underside thickly covered with

pale golden pubescence, the flagellum with a microscopic down. Head thickly covered with golden pubescence; the cheeks and face bearing also long pale hairs. The large eyes distinctly converge above. Clypeus closely punctured; the apex smooth, with a slight incision in the middle. Mandibles at the base thickly covered with golden pubescence. Palpi black, thickly covered with pale hair. Pro- and mesothorax with the scutellums thickly covered with depressed bright golden pubescence, which hides the texture of the skin; the median segment above sparsely, on the sides thickly, covered with fulvous pubescence; the upper part at the base and apex closely irregularly transversely striated; on the apex near the top is a pyriform depression. Breast thickly covered with golden pubescence and with long pale hair; the central furrow is shallow, the transverse one before the middle coxæ is deeper and more distinctly defined; the process between the four hind legs is clearly defined; furrowed down the middle except at the base; the apex is rounded at the sides and incised in the middle. Wings yellowish hyaline, the apex slightly infuscated; the nervures are yellow; the first cubital cellule at the top is one third the length of the second; the first transverse cubital nervure is roundly curved; the two recurrent nervures are united at the top before reaching the cubital nervure, being shortly but distinctly appendiculated. Legs thickly covered with depressed golden pubescence; the tibial and tarsal spines are rufous; the calcaria and claws black. Abdomen with the basal four segments broadly banded on the apex with depressed golden pubescence; pygidium black; the stiff pile black; on the sides and apex are a few long black hairs; the base has an irregular smooth and shining space in the middle.

The basal segments of the abdomen may be entirely covered with golden pubescence.

*Chrysolarra aureosericea*, sp. n.

Long. 18-19 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Comes near to *C. appendiculata*, with which it agrees in the colour of the pubescence and in having the two recurrent nervures united at the top; may be known from it by the first transverse cubital nervure having an oblique straight slope at top and bottom; the first cubital cellule is longer, being half the length of the second above; the metasternal process is distinctly keeled down the middle at the base, and



the furrow is wider and deeper; its apical lobes are more widely separated and the tarsi are more slenderly built.

Head covered with golden pubescence; the front and vertex closely punctured; the furrow above the antennæ is wide and deep; the clypeus is sparsely punctured below the middle. Mandibles and palpi black, the latter thickly covered with white hairs. Mesonotum alutaceous, as is also the scutellum; the postscutellum is more distinctly punctured. Median segment irregularly, closely, transversely striated; the apex has the apical three fourths furrowed down the middle. Mesopleuræ closely and finely punctured. The metasternal process is large, keeled in the middle at the base; the rest furrowed, the furrow deepest at the base and apex; the latter is triangular in the middle. Legs black, pruinose, the tibial and tarsal spines rufous; the calcaria and spurs black. Wings yellowish, lighter coloured in the middle of the cellules; the apex darker; the stigma and nervures yellow; the first cubital cellule at the top is more than half the length of the second; the first transverse cubital nervure is obliquely sloped at top and bottom; the recurrent nervures united shortly before reaching the cubital nervure. The basal four segments of the abdomen are thickly covered with golden pubescence. The stiff pile on the pygidium is rufous at the edges.

This is a smaller species than *C. appendiculata*; the recurrent nervures are not so distinctly appendiculated above; the first cubital cellule at the top is longer compared with the second, being more than half its length, and the first transverse cubital nervure is straighter and more distinctly angled above.

*Chrysolarra japonica*, sp. n.

Long. 16 mm.

*Hab.* Japan (George Lewis).

This is a smaller species than *C. appendiculata* or *C. aureosericea*, and differs from them in the recurrent nervures not being appendiculated, although they touch each other at the cubital nervure.

The lower part of the front, the cheeks, and oral region densely covered with bright golden pubescence; the front and vertex alutaceous, sparsely covered with bright golden pubescence; the ocellus is triangularly produced in front. Pro- and mesothorax covered with deep rufo-fulvous pubescence, most thickly on the mesonotum; the pubescence on the median segment is paler, more fulvous in tint. Median

segment alutaceous; the apex obscurely transversely striated, and with a smooth conical depression in the middle. Legs thickly covered with golden pubescence, more thickly on the tibiæ and tarsi than on the femora; there are five rows of stout rufous spines on the four hinder tibiæ; the tarsal spines are long, stout, and rufous. Wings yellowish hyaline, the apex from the base of the radial cellule infuscated; the first cubital cellule at the top is not quite half the length of the second; the first transverse cubital nervure is obliquely curved from shortly above the middle and straight; the lower part has a more rounded slope; the two recurrent nervures are received near the apex of the basal third of the cellule. The three basal segments (and perhaps the others also) are banded at the apex with depressed pale golden pile. The pygidium appears stoutly, longitudinally, and closely striated and bears some longish dark rufous hairs. The tarsi have a more rufous appearance than the tibiæ; the golden pile appears to be thicker on the front legs than on the others.

*Chrysolarra pruinosa*, sp. n.

Black, thickly covered with a pale golden pile, the pygidium densely with stiff golden bristles; wings hyaline, slightly infuscated at the apex; the third cubital cellule above twice the length of the second; the recurrent nervures united, but not appendiculated. ♀.

Long. 16 mm.

*Hab.* Matang, Borneo. Mus. Sarawak.

The lower part of the front, the face, and probably the clypeus densely covered with a golden pale pile. Front and vertex alutaceous; there is a deep furrow below the lower ocellus; the eyes at the top are separated by about half the length of the third antennal joint. Thorax covered with a golden pile; the scutellum has an indistinct shallow furrow in the centre; the median segment at the base has a narrow furrow down the middle, which ends in a fovea shortly before the top of the truncation. The latter has an oblique slope and has a narrow furrow in the centre. There is a narrow longitudinal furrow near the centre of the mesopleuræ. Wings hyaline, with a slight yellowish tinge; the apex slightly infuscated; the basal nervures are yellowish, the apical darker in colour; the second cubital nervure is half the length of the third; the recurrent nervures are united and are received shortly behind the middle of the cellule. Legs black, pruinose; the tibial and tarsal spines are black, some of the latter are rufous at the base, those on the front tarsi

are longer than they are on the other legs. Abdomen black; the segments banded with pale golden pubescence; the pygidium is thickly covered with stiff bright golden pubescence and more sparsely with long golden hair. The apex of the hinder tibiæ and the underside of the metatarsus are thickly covered with stiff golden pubescence.

Comes nearest to *C. japonica*, Cam., which agrees with it in the recurrent nervures not being appendiculated.

### Braconidæ.

#### PÆCILOBRACON, gen. nov.

Head cubital, largely developed behind the eyes, the temples being longer than the eyes. Occiput roundly but not deeply incised and not margined. Eyes oval, widely distant from the base of the mandibles. The upper half of the face is widely and deeply furrowed; the apex of the furrow is wider and deeper than the base. Abdomen smooth, with only the suturiform depression; the penultimate segment shorter than the preceding; the hypopygium large, projecting beyond the upper segment, cultriform. Ovipositor projecting. The anterior tarsi are twice the length of their tibiæ. Second cubital cellule twice the length of the first; the second abscissa of the radius twice as long as the first transverse cubitus. The scape of the antennæ is short and projects on the underside at the apex; the pedicle is short. In the hind wings the costal and præbrachial and the radial and cubital cellules only are complete, but the latter two are open at the apex; at the base there is a distinct small cell, formed by a stout oblique nervure, which unites with the costal.

The body is smooth and shining, black, with the abdominal segments banded with pale yellow; the mandibles are stout, curved, and unidentate at the apex; the legs are covered with soft hair, but not so thickly as in *Myosoma*; the suturiform articulation bifurcates laterally; the metathoracic spiracles are oval and distinct; the apices of the tarsal joints are spinose, their claws are small, the palpi are long and pilose.

Belongs to the Braconini, and, in Ashmead's arrangement (Proc. U.S. Nat. Mus. xxiii. 136), would come near to the American genus *Megaproctus*.

#### *Pæcilobracon flaviceps*, sp. n.

Niger, capite flavo, vertice nigro; abdomine flavo lineato; alis fuscis, stigmatibus nervisque nigris. ♀.

Long. 10, terebra 7 mm.

*Hab.* Australia.

Smooth, shining, and moderately thickly covered with soft pale hair. Mandibles pale yellow, black at the apex; the front and the ocellar region black; the black mark becoming gradually narrowed above from below. Palpi long, black at the base, testaceous at the apex, and covered with soft white pubescence. Postscutellum broadly depressed laterally at the base. The sides and ventral surface of the petiole are pallid yellow; the basal area on the second segment is large and becomes gradually roundly narrowed towards the apex; the bounding furrow is wide and deep, this being also the case with the oblique lateral; both may be rufous. The suturiform articulation is closely striated, the lateral fork is smooth, deep, and does not reach to the end of the segment; the five basal segments have their apices lined narrowly with pale yellow, the yellow extending on to the ventral surface on the third and fourth segments. There is an oblique narrow hyaline cloud in the first cubital cellule, which extends as a small round spot into the discoidal cellule.

The abdomen is shorter than the thorax, broad, the apical three segments becoming gradually narrowed.

XX.—*New and little-known Moths from India and Australia.*  
By Colonel C. SWINHOE, M.A., F.L.S., &c.

Family Eupterotidæ.

*Eupterote dulcinia*, nov.

♂. Bright chrome-yellow; the antennæ, head, thorax, and outer portions of the wings slightly darker than the general colour; a faint indication of a straight discal line on the hind wings, otherwise absolutely without markings: underside slightly paler than above, with indications of a straight discal line across both wings.

♀. Dark chrome-yellow, absolutely without markings above and below.

Expanse of wings, ♂  $3\frac{1}{10}$ , ♀  $3\frac{1}{2}$  inches.

Salayar Island, south of Celebes (*Everett*).

A long series of both sexes: some of the males are nearly as pale as *E. calandra*, Swinh., from the Khasia Hills, but the antennæ are longer and more deeply pectinated; in three or four of the females the straight discal line in hind wings is more or less apparent.



## Family Chalcosiidæ.

*Cyclosia phonia*, nov.

♀. Upperside deep black; wings with a dull dark green sheen in certain lights; a broad white band across the disc of fore wings, composed of nine spots, formed by intersection of the veins, and two additional spots at the upper and lower ends of the cell; cilia white at apex of hind wings; shaft of antennæ bright shining blue; frons, base of antennæ, top of head, collar, thorax, and abdomen at sides marked with the same colour. Underside: abdomen with white segmental bands; blue sheen on costa of both wings, also on the principal veins, and blue submarginal spots on hind wings; the band on fore wings same as on upperside, with three additional small white subapical dots, a white subcostal spot beyond middle on fore wings and two in the middle near the outer margin.

Expanse of wings  $2\frac{7}{10}$  inches.

Lawas (*Everett*).

## Family Lithosiidæ.

*Chionema saulia*, nov.

♀. Pure white; antennæ ochreous; palpi with first and second joints crimson, third black; thorax with a crimson band in front and in the middle: fore wings with a large black spot at the end of cell, transverse bands thin, crimson, first subbasal short, second and third antemedial and discal slightly curving outwards, fourth close to the apex; abdomen pinkish towards the tip: hind wings without markings. Underside white, uniform, without markings except for its crimson pectus; fore and hind legs with the tibiæ crimson above; the tarsi black above with white spots.

Expanse of wings  $1\frac{7}{10}$  inch.

Paitan (*Everett*).

## Family Drepanulidæ.

*Callidrepana xanthoptera*.

*Drepana xanthoptera*, Hmps. Moths Ind. i. p. 341 (1892).

Naga Hills, Khasia Hills.

This species belongs to Hampson's Section II. B. Vein 10 from end of areole, 11 from cell; antennæ bipectinated in both sexes. It was originally described from a male example; I have now both sexes.

Family **Cossidæ**.*Duomitus tectorius*, nov.

♂. Antennæ brown; head, thorax, and abdomen ochreous grey, the latter with brownish-grey bands: fore wings white, minutely striated with brown; a large brown patch at the base, limited hindwards by the median vein; a smaller brown nearly square patch on the costa beyond the middle and some small brown spots on the costa between and beyond: hind wings white suffused with grey and covered with brown striations, otherwise unmarked. Underside: body and wings covered with grey suffusions: fore wings with the costal outer patch and some brownish elongated patches in the disc between the veins; hind wings with a long brown mark at the upper end of cell: tarsi black with ochreous bands.

Expanse of wings  $2\frac{2}{10}$  inches.

Solomon Islands.

Somewhat resembles *D. (Cossus) maculatus*, Snellen, Tijds. voor Ent. xxii. p. 125, pl. x. f. 4 (1878). There are two examples of a closely allied form from Singapore, unnamed, in the B. M.

Family **Macariidæ**.*Luxiaria gammaria*, nov.

♂. Palpi and frons brown; head, body, and wings ochreous grey: fore wings with five brown patches on the costa, a large black lunule at the end of the cell; both wings covered with pale red irrorations, which are closely packed together and form a broad indistinct marginal band which is intersected by a submarginal lunular whitish band, on the inner side of this broad band is a dentated line with brown points, an extra similar line across the middle of hind wings. Underside: colour paler and brighter, with antemedial and postmedial bright chocolate-red bands across both wings.

Expanse of wings  $1\frac{4}{10}$  inch.

Lawas (*Everett*).

The hind wing is rather more acutely angled at the middle of the outer margin than is usual. There is an example in the B. M., unnamed, from Pulo Laut.

Family **Ennomidæ**.*Hypochrosis hiresia*, nov.

♂. Frons brown; top of head greyish white; antennæ blackish brown; body and wings pale greyish ochreous,

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transverse bands chocolate-brown, disposed as is usual in the *hyadaria* group, the two on the fore wings rather closer together than usual, more sinuous and irregular and not straight; the usual ringlet at the end of the cell; the entire surface of both wings striated with brown, the space between the bands in the fore wings and the basal space of the hind wings so minutely as to be hardly visible: underside bright orange, the hinder marginal space of fore wings pale grey.

Expanse of wings  $1\frac{1}{2}$  inch.

Flores (*Everett*).

In one example there are some brown patches in the disc of fore wings; the colour of this form is paler than in *sulphurescens*, Moore, paler than in any form of the genus yet described.

### Family Trifidæ.

#### *Heliocheilus osmidus*, nov.

♂ ♀. Upperside of palpi, head, thorax, and fore wings pinkish grey; palpi white beneath; the male has a lesser tinge of pink than the female and has also a few white scales on the top of the head, which are wanting in the other sex; a broad white stripe runs through the cell from near the base to the outer margin of the fore wings, and there are some suffused dark grey stripes on some of the principal veins, most prominent on vein 1 *a* and on the median vein; cilia with white tips; abdomen pale ochreous grey, with the basal segment white: hind wings whitish, with the outer margin broadly suffused with grey; cilia pure white. Underside: wings white, the fore wing suffused with dark grey, leaving the margins and longitudinal streak white; thorax with long white hairs.

Expanse of wings, ♂ 1, ♀  $1\frac{2}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Types in Mus. Oxon.

#### *Heliocheilus cladotus*, nov.

♂ ♀. Palpi above, head, and thorax pale ochreous-fawn colour, palpi beneath white; abdomen ochreous grey; wings white: fore wings with the veins broadly dark ochreous-fawn colour, this colour predominating and leaving a white streak on hinder margin, another from base to outer margin below the median vein and vein 2, and a third through the cell and below veins 5 and 6; outer marginal line dark fawn-colour, in each interspace a large marginal white spot, inside these spots are dark fawn-coloured spots forming a

submarginal dark band: hind wings with the veins thinly ochreous-fawn colour, and some slight suffusion of this colour in the outer marginal area. Underside white; fore wings with a brown mark at end of cell, a brown submarginal band and white marginal large spots: hind wings unmarked.

Expanse of wings  $1\frac{2}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Types in Mus. Oxon.

*Canthylidia canusina*, nov.

♂ ♀. Upperside of palpi and head ochreous brown, underside of palpi white; thorax dark ochreous grey, with white thin bands; abdomen whitish with grey dorsal bands: fore wings ochreous white, the female is unmarked except for the brown stigma at end of cell on the underside showing through the wing, but the male in addition to this has a large blackish-brown suffusion occupying nearly a third of the wing, and extending from the median vein to the hinder margin, but not touching the base on the outer margin, there are also some brownish marks near the apex; cilia white; hind wings white, unmarked. Underside white; fore wings with a large square brown mark at the end of the cell, and some brown internal suffusion, which in the female is less than in the male.

Expanse of wings  $\frac{9}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Types in Mus. Oxon.

*Canthylidia cistella*, nov.

♂. Palpi above, head, and collar pale ochreous brown; thorax ochreous grey, nearly white; abdomen white; wings white: fore wings with a subbasal short blackish band, another before the middle, straight, complete, and nearly upright, a black orbicular spot close to its inner side, a similar spot below touching the band, a square black reniform followed by a subdentate black thin band which curves outwardly round the reniform, then down to the hinder margin at two thirds from the base; black marginal points, inside of which are white spots and a grey suffused band, leaving a narrow white space on the outer side of the curved band: hind wings with a grey marginal band, spotted with white; cilia of both wings white. Underside white, with the black spots and marginal bands as above.

Expanse of wings  $\frac{9}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Type in Mus. Oxon.



*Adisura ionola*, nov.

♂ ♀. Upperside of palpi, head, and thorax pale ochreous brown, palpi white beneath; fore wings dark pink, with a pale yellowish stripe running through the cell from the base to the outer margin, a double-lined stigma at the end of cell within the stripe; abdomen ochreous grey, a broad dull red band near the base followed by three or four indistinct broken bands: hind wings whitish, with broad greyish suffusions. Underside ochreous white, a large square brown stigma at the end of cell of fore wings and (in the male only) some brown suffusions on the borders; thorax and legs dull ochreous grey; abdomen white, with broad dark grey bands.

Expanse of wings 1 inch.

Towranna Plains, W. Australia (*E. Clement*).

Types in Mus. Oxon.

*Heliothis neuroides*, nov.

♂ ♀. Palpi ochreous grey, speckled with brown; head and thorax red-brown, striped with brown and grey: fore wings brown; veins blackish, lined with grey; cilia with grey spots, some pinkish streaks in the discoidal, discal, and hinder marginal interspaces, from base to outer margin, interrupted in the cell by the orbicular and reniform, which are grey, the former oval, the latter like a crooked figure of 8: hind wings whitish with grey borders. Underside whitish: fore wings suffused with grey, some grey suffusion on central and outer areas of hind wing; legs grey, tarsi with white spots.

Expanse of wings  $1\frac{4}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Types in Mus. Oxon.

*Euplexia orophora*, nov.

♂. Pale ochreous olive-grey; palpi brown above: fore wings with many black and white spots and markings, forming several incomplete transverse lines, the two most distinct being subbasal and discal, both composed of black lunules edged outwardly with white; a submarginal very irregular band of black and white marks, mostly white towards apex, also some black and white points on the margin: hind wings suffused with brown, paling towards the base. Underside ochreous grey, nearly white, with broad brown outer margins and a large black lunule at the end of cell on hind wings.

Expanse of wings  $1\frac{4}{10}$  inch.

Tasmania.

Close to *E. albidisca*, Moore, from Bengal, but more varied with white.

*Amphypira tragopogonis.**Phalæna-Noctua tragopogonis*, Linn. Faun. Suec. p. 1189 (1748).Kulu (*Graham Young*).

Does not appear to have been hitherto recorded from India; there are examples in the B. M. from Scind Valley and Sultanpore. It has a very wide palæarctic range—N. America, Europe, and N. India.

*Diethusa insularis.**Hyperdasis insularis*, Butler, Ann. & Mag. N. H. (5) x. p. 230 (1882).

Kiriwini, Trobriand Island; Duke of York Island; Solomons; New Hebrides; Pulò Laut; Kapaur; Fergusson Island; Burma.

This species is not included in Hampson's 'Moths of India,' but appears to be very widely spread; there is an example in the B. M., which I cannot separate from it, from Natal.

## Family Acontiidæ.

*Erastria umbrifera.**Hyboma umbrifera*, Butler, Ill. Het. B. M. vii. p. 46, pl. cxxvi. fig. 1 (1889).*Dipterygia umbrifera*, Hmps. Moths Ind. ii. p. 236 (1894).

Khasia Hills.

The type came from Dharmasala; it is an Acontiid of the genus *Erastria*.

*Bryophila lamia*, nov.

♂. Olive-brown: fore wings with antemedial, postmedial, and submarginal blackish transverse sinuous lines; a short subbasal line followed by blackish spots; a black lunule at end of cell and above it a blackish patch touching the costa; some blackish suffusion on the lower half of the postmedial line, also some on its outer edge, making this line look as if it were duplex in parts, some similar suffusion on the inner side of the submarginal line, marginal points black; cilia olive-grey with pale patches: hind wings without markings; cilia grey. Underside olive-grey, shining, indications of a pale discal band; a spot at end of cell of hind wings, black marginal line, with some pale streaks running inwards; fore tibiæ with pale bands.

Expanse of wings  $\frac{9}{16}$  inch.

Beeling, Burma.

## Family Euteliidæ.

*Eutelia muttia*, nov.

♂. Palpi brown; head, thorax, and abdomen ochreous grey, a brown spot on each side at base of the thorax; three grey-brown bands on the central segments of the abdomen: fore wings ochreous grey, suffused in parts with blackish brown, an antemedial curved brown line from hinder margin ending in an orbicular spot below the costa, a large reniform brown mark and a brown sinuous discal line curving round it: hind wings mostly blackish brown, their centres ochreous grey. Underside: both wings ochreous grey suffused in parts with brown; fore wings with the large reniform and outer line; hind wings with cell-spot and two outer brown lines.

Expanse of wings 1 inch.

Goping, Perak (*Künstler*); Port Blair; Andaman Isles (*Wimberly*).

Allied to *E. deleta*, Hmps. n.

## Family Sarrothripidæ.

*Blenina puloa*, nov.

♂. Palpi greyish white, a black spot on the sides at tip of first joint, one at base of second joint, and black bands at base and tip of third joint; head, body, and fore wings grey, suffused with dull green except on the disc, where there is a whitish space; costa with some black marks, an indistinct transverse broad band just beyond the middle, composed mostly of greenish scales, and bordered hindwards on each side with black, the outer line widening the band outwards on to the hinder margin, and containing a blackish stigma at the end of the cell and a black band a little above the hinder margin of the wing; a submarginal duplex band of green lunular marks and marginal white spots and black points; cilia nearly white with brown patches: hind wings brown, paling towards base and abdominal margin. Underside: fore wings brown, hinder margin grey; hind wings grey with a brown marginal band; cilia of both wings whitish; hind tarsi with brown bands.

Expanse of wings  $1\frac{1}{10}$  inch.

Luzon, Philippines.

There are examples in the B. M., unnamed, from Pulo Laut and Talaut; it much resembles *Charocoma albulalis*, Walker, from Sarawak; it is not referred to by Semper in his 'Schmett. der Philipp. Inseln.'

Family **Quadrifidæ**.Genus **SUNDWARDA**, nov.

♂. Palpi porrect, small and covered with hair, last joint short; antennæ strongly bipectinated for two thirds their length; legs hairy; hind tibiæ with two pairs of short spurs: fore wings with veins 3 and 4 from lower angle of cell, 5 from a little above the angle, 6 from upper angle, 7, 8, and 9 stalked, 10 from four fifths of cell, 11 from two thirds: hind wings with veins 3 and 4 from lower angle of cell, 5 from halfway between the middle and the lower angle, 6 and 7 from upper angle, 8 anastomosing with 7 near the base.

Will stand near *Trisuloides* at the commencement of the *Quadrifidæ*.

*Sundwarda efulgida*, nov.

♂. Antennæ brown; palpi and frons deep black; top of head, body, and wings shining white, bands and markings deep black; a band on the collar, some marks on the thorax; abdomen black, with a white macular dorsal stripe: fore wings with black lunular spots on the costa at equal distances apart, the subapical one large and pointed into the wing, orbicular invisible, reniform a black ring; some black short stripes near the base and on the veins at the outer margin, a row of discal spear-shaped marks, and two or three sinuous and irregular transverse lines filling up the wing: hind wings tinged with grey, with grey veins; cilia of both wings with black patches.

Expanse of wings  $1\frac{4}{10}$  inch.

Sarawak.

There is an example in Mr. Herbert Druce's collection from Perak.

*Praxis selecta*, nov.

♂ ♀. Palpi pale ochreous, speckled with black on their upperside; head, thorax, and fore wings brown, banded and spotted with reddish pink, the thorax being mostly pink; costa with pale ochreous spots, two transverse bands close to the base, one nearly erect before the middle; orbicular and reniform pink, the former touching the outer side of this band, the latter touching the inner side of a postmedial band, which curves round it and then descends to the hinder margin close to the other band, all these bands are formed in large curves or lunules; there is also a submarginal band of dentated marks, the points outwards lined with black,



and small pink lunules and points on the margin, with the marginal line black; between all the bands in the male are some whitish marks; the abdomen and hind wings are purple-grey, the former with pink segmental bands, the latter with a central thin white transverse band, some pink marks near anal angle, black marginal line and pink points; cilia grey, of hind wings white at apex and anal angle. Underside whitish grey, base white; a white central band across both wings, a suffused brown marginal band on hind wings with a pink band inside it.

Expanse of wings  $1\frac{2}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Types in Mus. Oxon.

It is marked much like *Praxis dirigens*, Walker, xv. 1801, except for the pink colour.

*Achæa argilla*, nov.

♂ ♀. Palpi, head, body, and fore wings of a uniform pale greyish clay-colour without any markings, the usual ante- and postmedial lines being obsolete: hind wings with the usual broad central white band, black marginal band with white spots as in *A. melicerte*, Drury, but the inner area of the wing is nearly white, being only slightly tinged with grey. Underside: both wings white, very slightly tinged with grey; fore wings with the black bands and hind wings with the black spot near anal angle, as in *A. melicerte*. Sexes alike.

Expanse of wings  $2\frac{2}{10}$  inches.

Towranna Plains, W. Australia (*E. Clement*).

Types in Mus. Oxon.

A very distinct and pretty form allied to *A. melicerte*, Drury, which I have also from Australia.

*Grammodes quæsitæ*, nov.

♂ ♀. Palpi grey; head, body, and wings dark purplish grey: fore wings with a deep black patch occupying the centre of the wing, bounded externally by an outwardly curved white line, which runs from costa to hinder margin, but the black patch does not extend to the costa but leaves a broad costal space clear and narrows hindwards and has an erect white band running through its middle, also a black irregular streak from apex, which extends in an irregular line to the hinder margin, running close to the outer margin of the patch; outside this line the wing has a grey sheen; cilia white at apex: hind wings more black than fore wings; a

white transverse band before the middle; cilia white with a brown patch in the centre.

Expanse of wings  $1\frac{1}{10}$  inch.

Coomo, Queensland.

There is an example of this insect in the B. M. from Port Darwin, mixed up with *G. geometrica*, Fabr., but though it superficially resembles a miniature form of that species, it will be found on examination to have very little in common with it.

*Grammodes Clementi*, nov.

♂. Palpi and frons white, a white line round the eyes; head, body, and wings of a uniform dull slaty brownish black; bands and spots white, a band nearly straight from costal third to hinder margin three-quarters from base, a dot at end of cell, a band from costal two-thirds, outwards to the middle, then acutely angled and curved in a thin line to the hinder margin close to the termination of the other band, the curve goes round a black ocellus ringed with grey, a white streak near apex, the costa at apex white and a white costal dot on the inner side of the streak; cilia white at apex: hind wings with a central band, slightly outwardly curved and attenuated hindwards to the anal angle; cilia white, with a brown patch in the middle. Underside white: wings with the basal half white, outer half of fore wings with an outwardly curved white discal band, with white broken streaks from the costa on both sides of it: hind wings with a brown thick line in the centre of the white part, a band of white lunules on inner margin of the brown part, some submarginal white lunules and cilia as above.

Expanse of wings  $1\frac{4}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Type in Mus. Oxon.

Closely allied to *G. oculata*, Snellen, from Celebes, Tijd. voor Ent. xxiii. p. 103, pl. viii. f. 6 (1880); but that insect has no subapical streak on the fore wings, and this is a very prominent character of the form now described. There are two examples in the B. M. mixed up with *G. oculicola*, Walker, to which it is also allied, but from which it is quite distinct.

*Nigusa oculita*, nov.

♀. Ochreous grey, very uniform in colour, except the palpi, head, and collar, which are red-brown; transverse lines on the wings brown and wavy, one before the middle, on fore wings only, two close together beyond the middle, with a large

ocellus at the end of the cell, round which the inside line curves, the ocellus is ochreous with a large black centre with white pupil, the ochreous outer part is ringed with black and then with white; the duplex line runs across the hind wing before its middle; across both wings are two lines nearly straight, close together on the disc; a submarginal deeply dentated line and a marginal line; cilia slightly paler than the wings. Underside brighter yellow, large round black spots at end of each cell, broad marginal brown borders; cilia ochreous grey.

Expanse of wings  $1\frac{9}{10}$  inch.

Towranna Plains, W. Australia (*E. Clement*).

Type in Mus. Oxon.

Two examples only; there are three unnamed in the B. M. The species is nearly allied to *N. spiramioides*, Walker, xv. 1855, the type of the genus.

### Family Focillidæ.

#### Genus OSERICANA, Walker.

*Osericana*, Walker, xxxiv. 1214 (1865).

*Mixtila*, Swinh. Cat. Het. Mus. Oxon. ii. p. 193 (1900).

*Pinacia*, Walker, xix. 919 (1859) (præocc.).

#### *Osericana albistella*.

*Osericana albistella*, Walker, *l. c.*

*Pinacia pupillalis*, Snellen, Tijd. voor Ent. xxviii. p. 8, pl. i. figs. 4, 4a (1885).

Sumatra, Celebes, Philippines.

### Family Hypenidæ.

#### *Dichromia otiata*, nov.

♂. Palpi, head, body, and fore wings black; a thin, pure white, straight and erect transverse band from costa two thirds from base to hinder margin a little before the angle: hind wings white; a black border, narrow on costa, broad on outer margin, attenuated gradually to a point at the anal angle, the border occupying two thirds of the wing-space. Underside as above, except that there is no white band on the fore wing.

Expanse of wings  $1\frac{6}{10}$  inch.

Flores.

Allied to *D. leucotaenia*, Snellen, Tijd. voor Ent. xxiii. p. 114 (1880), and xxiv. p. 67, pl. v. fig. 1 (1881), from Celebes; differs chiefly in the narrow white band of fore

wings above and the absence of the white band on those wings below. There is an example of Snellen's species from S. Celebes in the B. M., unnamed, in the *Dichromia* drawer.

### Family Nymphulidæ.

#### Genus CAMPTOMASTIX.

*Camptomastix*, Warren, Ann. & Mag. Nat. Hist. (6) ix. p. 439 (1892).

*Camptomastyx*, Hmps. Moths Ind. iv. p. 238 (1896); Trans. Ent. Soc. 1897, p. 215.

Warren's type is *pacalis*, Leech.

Hampson's type is *hisbonalis*, Walker.

The two are conspecific. Sir George Hampson had overlooked the fact that Warren had described the genus in 1892. It will have to stand as *Camptomastix*, Warren, not *Camptomastyx*, Hampson.

#### *Oligostigma eromenalis*.

*Cænostola eromenalis*, Snellen, Tijds. voor Ent. xxiii. p. 226 (1880), xxvii. p. 6, pl. iii. fig. 4 (1884).

*Oligostigma eromenalis*, Hmps. Trans. Ent. Soc. 1897, p. 160.

Celebes, Philippines; Queensland, Australia.

In Trans. Ent. Soc. 1897, p. 160, Hampson sinks this species to *Ambia ptolycusalis*, Walker, which should be corrected.

### Family Endotrichidæ.

#### *Cangetta rectilinea*.

*Cangetta rectilinea*, Moore, Lep. Ceylon, iii. p. 314, pl. clxxxii. fig. 3 (1886).

*Paraponyx hartoghialis*, Snellen, Tijds. voor Ent. xv. p. 97, pl. vii. figs. 6, 7 (1872).

*Paraponyx griseolalis*, Hmps. Ill. Het. ix. p. 176, pl. clxxiv. fig. 12 (1893).

Khasia Hills, Ceylon, New Guinea.

Snellen informs me that his species is identical with Moore's; he has also brought to my notice that Sir George Hampson has apparently omitted *Botys fatualis*, Led., altogether. Lederer's figure is good, but, as I have not seen the species, I do not know where it should stand.

### Family Pyraustidæ.

#### *Entephria pulchralis*, nov.

♂. Palpi, frons, and top of head white; body and wings bright primrose-yellow, markings dark chocolate; a band on



the collar, three on thorax, central and on the sides: fore wings with three parallel upright bands before the middle, the first being short and close to the base; an angular band from costa at three fourths to vein 2 above the hinder angle, then elbowed straight to a spot at the end of the cell, below which is a short nearly upright band from the middle of the hinder margin; a submarginal even line, another similar marginal line: hind wings with a band before the middle extending to the anal angle; a discal band elbowed at vein 3 and turned upwards; a submarginal line not reaching the abdominal margin, and a marginal line; cilia of both wings white, containing a basal blackish line and grey tips.

Expanse of wings  $1\frac{8}{10}$  inch.

Rangeon.

In one example the bands are much broader than in the others and there is some ochreous suffusion at the anal angle of the hind wings.

### *Tabidia inconsequens.*

*Nymphula* (?) *inconsequens*, Warren, Ann. & Mag. Nat. Hist. (6) xvii. p. 204 (1896).

*Orphnophanes inconsequens*, Hmps. Moths Ind. iv. p. 231 (1896).

Dawson, Queensland.

Though the examples from Australia are greyer and less yellowish than the Khasia Hill forms, I can find no specific difference.

This species is made an *Orphnophanes* in the B. M., a genus belonging to the Hydrocampidæ; but vein 10 of fore wings is only closely approximated to 9 and 8 and vein 2 rises from close to base—a characteristic, as Hampson himself says, of *Tabidia* type.

### *Pagyda pulverulenta*, nov.

♂. Pale ochreous brown; palpi beneath white: hind wings with the costal space whitish, otherwise the ochreous-brown colour is very uniform throughout; transverse lines brown, disposed much as in *P. salvalis*, Walker, and *P. discolor*, Swinh., but very fine and thin; the submarginal line straight as in *discolor*, but composed of dots; marginal line brown; cilia slightly paler than the wing-colour, with a brown basal line. Underside ochreous grey, shining.

Expanse of wings 1 inch.

Khasia Hills.

*Nacoleia gratalis.*

*Botys gratalis*, Led. Wien. ent. Mon. vii. p. 475, pl. xi. fig. 18 (1863); Walker, xxxiv. 1390 (1865); Snellen, Tijds. voor Ent. xxvi. pl. viii. figs. 2, 2a (1883).

*Semioceros gratalis*, Meyrick, Trans. Ent. Soc. 1884, p. 318.

*Goniorhynchus gratalis*, Hmps. (nec Led.), Moths India, iv. p. 322 (1896); P. Z. S. 1898, p. 706.

*Botys minualis*, Hmps. (nec Walker) l. c.

## Java.

Sir George Hampson makes *gratalis*, Led., the type of his genus *Goniorhynchus* through misidentification, his description being made from a specimen of *minualis*, Walker, which he believed to be identical with *gratalis*, Led.; but though superficially alike, they are very different insects. The palpi of *gratalis* are described by Lederer and have been figured by Snellen as shown above, and the latter has very kindly sent me a specimen for examination; Snellen seems to have been perfectly right in putting it in Meyrick's genus *Semioceros* (see Trans. Ent. Soc. 1884, p. 318), but when describing this genus Meyrick overlooked the fact that *murcalis* = *murcusalis*, Walker, xix. 933, is the type of Walker's genus *Nacoleia*, and that *amphicedalis*, Walker, is congeneric.

## Genus METASIODES, Meyrick.

*Metasiodes*, Meyrick, Trans. Ent. Soc. 1894, p. 8.

*Blepharomastix*, Hmps. (nec Led.) Moths Ind. iv. p. 312 (1896).

*Metasiodes heliaula.*

*Metasiodes heliaula*, Meyrick, l. c.

*Nacoleia heliaula*, Hmps. l. c. p. 318.

## Burma, Shan States.

Sir George Hampson spells the name *Metasciodes*, but Meyrick's name is without the *c*—*Metasiodes* (like *Metasia*); he sinks Meyrick's genus to *Blepharomastix*, a genus that was erected by Lederer for a group of purely American moths of delicate build and long narrow wings, having, I am of opinion, nothing in common with the species of Meyrick's *Metasiodes*, and this Hampson again makes a subsection of the genus *Nacoleia*, Walker.

*Margaronia lucretila*, nov.

♂. Palpi chestnut-brown, head chestnut-grey; a dark chestnut band on the collar; body and wings pure white; a chestnut-brown band from the costa of fore wings beyond the middle to the lower end of cell, where it joins a similarly

coloured narrower band, which curves inwards from the costa near apex and then extends to the hinder margin at two thirds from base; the first band has a whitish line running through it, the second is followed by a whitish line and a broad marginal orange band with a whitish line dividing it, the whitish lines in certain lights have a blue tint: hind wings with a large orange-brown patch in the centre of the disc, extending to outer margin, containing a metallic blue band near its inner side, and three black spots on the margin sprinkled with metallic blue scales. Underside white, unmarked.

Expanse of wings  $1\frac{1}{10}$  inch.

Solomon Islands.

*Lepidoplaga flavicinctalis.*

*Crocidophora* (?) *flavicinctalis*, Snellen, Trans. Ent. Soc. 1890, p. 595.

*Lepidoplaga longicarpus*, Warren, Ann. & Mag. Nat. Hist. (6) xviii. p. 108 (1896).

*Lepidoplaga elongalis*, Warren, *l. c.*

*Pionea flavofimbriata.*

*Mabra flavofimbriata*, Moore, Descr. Ind. Lep. Atk. p. 208 (1888).

I have received a long series of both these perfectly distinct moths from the higher Khasias and from the Jaintia Hills; Sir George Hampson has put them all together (Moths Ind. iv. p. 427).

In his description of the latter (Lep. Atk. p. 208) Moore gives the expanse of wings  $\frac{4}{8}$ – $\frac{5}{8}$  inch = 13–18 mm.; Hampson says 24 mm., his description being taken from *flavicinctalis*; but *flavofimbriata* does not belong to the same genus, and is not a *Lepidoplaga*; it has no scale-tuft below at end of cell nor exaggerated retinaculum as in *flavicinctalis*.

The genus *Lepidoplaga* has been made a section of the genus *Pionea*, which can hardly be its right place; its peculiar characteristics are equally present in one of the groups of *Crocidophora*, where, I think, it would be more appropriate.

Besides Moore's two type specimens of *flavofimbriata* in the B. M., there is a male example from the Khasia Hills identical with mine.

*Pionea aureolalis.*

*Botys aureolalis*, Led. Wien. ent. Mon. vii. pp. 375 & 473 (1863).

*Pionea aureolalis*, Hmps. Moths Ind. iv. p. 424 (1896); P. Z. S. 1899, p. 246.

*Dichrocrocis evaxalis*, Hmps. (part.), Moths Ind. iv. p. 305; P. Z. S. 1898, p. 688.

Khasia Hills.

The type came from the Himalayas. In Hampson's Moths, iv. p. 305, *aureolalis*, Led., is made a synonym of *D. evaxalis*, Walker; at p. 424 he makes *aureolalis*, Led., a *Pionea*, and sinks *ochrealis*, Moore, and *contractalis*, Warren, to it; these last two have different scaling, are of a different shade of yellow, and, I think, are good forms: in P. Z. S. 1898, p. 689, and 1899, p. 246, he repeats the same positions, but in the former he gives Lederer's reference as p. 473, and in the latter as p. 375; but both Lederer's references refer to the same insect, the former being a list with localities and the latter a description of the same.

*Hemiscopsis polusalis*.

*Botys polusalis*, Walker, xviii. 703 (1859).

*Hydrorybina polusalis*, Hmps. Moths Ind. iv. p. 239 (1896).

*Clupeosoma polusalis*, Hmps. Trans. Ent. Soc. 1897, p. 217.

Sarawak, Borneo.

The genus *Clupeosoma* = *Hydrorybina* belongs to the family Hydrocampidæ; but from the examination of a number of examples of this species from Sarawak I find that it does not belong to that family: vein 10 on fore wings is not stalked with 8 and 9, it is really only approximated to 8 and 9; it is necessary to denude the wing of scales to see this properly. The species fits well into the genus *Hemiscopsis*, Warren.

XXI.—On a Collection of Mammals from the Kanuku Mountains, British Guiana. By OLDFIELD THOMAS, F.R.S.

By the help of Mr. F. V. McConnell, Mr. J. J. Quelch, recently Director of the British Guiana Museum, has been enabled to make a collecting expedition to the Savannah region in the interior of the colony, near the Brazilian boundary. The collection was formed in the Kanuku Mountains, about 59° W. and 3° N., and on the savannahs near their base, at altitudes varying from 240 to 2000 feet.

Mr. McConnell, whose name is already known to science by his exploration of Mt. Roraima\*, has been generous enough to present the whole of the mammals obtained by Mr. Quelch to the National Museum, and I have now the privilege of giving an account of them.

The collection proves to be of extraordinary and quite

\* See Trans. Linn. Soc., 2nd ser. Zool. viii. p. 51.



unexpected interest, and the proportion of novelties most unusual. This has been mainly due to the fact that so many Guianan and Brazilian forms have been presumed, without close comparison, to be identical with each other, while now Mr. Quelch's collection shows that although representative of each other the species are not as a rule the same. Thanks to the invaluable collections of Mr. Alphonse Robert from São Paulo, I have had for comparison with Mr. Quelch's specimens examples of most of the Brazilian species made, like Mr. Quelch's, in the most approved modern style.

No less than ten species and subspecies have now had to be described as new, and a new genus of bats has also been discovered, so that both Mr. McConnell and Mr. Quelch are to be congratulated on the highly successful result of the latter's expedition. And even when not new, such excellent series of specimens form an addition of the utmost value to the Museum Collection.

1. *Myotis*, sp.

Six skins and three spirit-specimens. Upokarit, N. Kanuku Mts., 240 feet. December 12, 1900.

2. *Rhynchonycteris naso*, Wied.

Six skins. 240 feet. October to December.

3. *Saccopteryx bilineata*, Temm.

Eight skins and three spirit-specimens. 240 feet. October.

4. *Saccopteryx leptura*, Schreb.

Two skins and three spirit-specimens. 300 feet. November.

5. *Saccopteryx canina*, Temm.

Five skins and four spirit-specimens. 600 to 2000 feet. November and December.

6. *Noctilio leporinus*, L.

One skin.

7. *Noctilio albiventer*, Spix.

Five skins and four spirit-specimens.

These specimens are all of the yellow-bellied type to which the name of *N. affinis* was applied by d'Orbigny and Gervais. I can find no cranial or other important differences between them and the whitish-bellied form of the species.

8. *Molossus maurus*, sp. n.

$\alpha$ . ♂ skin. December 11. Alt. 240 feet. *Type*.

Incisors  $\frac{2}{4}$ . Premolars  $\frac{1-1}{2-2}$ . Other characters much as in *M. (Promops) abrasus*.

General appearance very much as in *M. abrasus*, the colour, texture of fur, and structure of ears being all about as in that species. Colour throughout dark chocolate-brown; hairs of back about 6 mm. in length. Ears of medium size, not united, their inner bases close together; no trace of the characteristic muzzle-ridge of *M. rufus*; inner lobe thickened, flattened externally; outer and inner edges straight, at about right angles to each other, the tip broadly rounded off; a small convexity at the outer base just before the deep antitragal notch; antitragus long and deep, so that it may be described as triangular with a rounded upper angle, quite unlike the circular antitragus of *M. rufus*; tragus small and narrow.

Gular sac distinct, at least in male. Limbs and membranes apparently naked throughout, except just at the base of the tail and femora.

Skull in its general shape, although smaller, remarkably like that of *M. abrasus*, the shape and height of the muzzle, the development of the crests, and the proportions of the brain-case all as in that species. Ante- and supra-orbital edges rounded; mesial crest low, commencing just in front of the most constricted part of the skull and running back to the occiput. Palate ending nearly a millimetre behind the level of the last molar. Angles of lower jaw slender, not abnormally expanded laterally.

Teeth in shape and proportion quite like those of *M. abrasus*, but there is no trace of the minute upper premolar.

Dimensions of the type:—

Forearm 53 millim.

Head and body (in flesh) 64; tail (in flesh) 51; ear 19; antitragus  $6.1 \times 4.5$ ; third finger, metacarpal 53, first phalanx 24.5, second phalanx 22.5; top of knee to tip of hind claw 29.

*Type*. B. M. no. 1. 6. 4. 34.

This distinct bat falls into the group that has been called *Myopterus*, and by its size, dentition, and elongated antitragus may be readily separated from any known species.

The original *Myopterus Daubentoni*, whose skull-dimensions, as given by Peters\*, agree closely with those of *M. maurus*,

\* MB. Ak. Berl. 1869, p. 402.

was said to have its under surface of a dirty white, with a tinge of yellow, so that it cannot have been the present form.

9. *Micronycteris megalotis*, Gray.

Five skins and two spirit-specimens. 600 and 2000 feet. November, 1900.

"In tree."

In connexion with this species it may be noted that specimen *g* of Dobson's Catalogue (in spirit) is the type described by Gray in 1842, not specimen *i* as there stated. Specimen *f* is the type of *Phyllostoma elongatum*, Gray *nec* Geoffroy, and therefore of *Ph. scrobiculatum*, Wagn.

10. *Phyllostoma latifolium*, sp. n.

Six skins and two spirit-specimens. 1000 feet, November 6; 600 feet, December 4.

Allied to *Ph. elongatum*, but smaller, the nose-leaf shorter, broader, and with scarcely a trace of central rib.

Size about as in *Ph. discolor*, therefore rather smaller than in *Ph. elongatum*. Fur soft and fine; hairs of back about 8 mm. in length. General colour above dark smoky brown, greyer over the head and nape, darker on the back; under surface uniformly dark greyish, like the nape. No facial markings. Limbs and membranes almost entirely naked, a few hairs on the proximal part of the forearm and on the base of the interfemoral membrane.

Nose-leaf very large, much larger than in *Ph. discolor*, though exceeded in length by that of *Ph. elongatum*. Horse-shoe simple, free in front. Lancet with its central rib almost imperceptible; its sides broadly and evenly rounded, not decidedly tapering towards the tip as is the case in *Ph. elongatum*. Ears large, more broadly rounded than in *Ph. elongatum*; inner margin evenly convex, tip broadly rounded off, upper half of outer margin flattened, lower half convex. Tragus as in the allied species. Wings to the ankles. Calcars long, reaching when laid upwards just to the knee. Penis long, longer than in the other species.

Skull on the whole similar to that of *Ph. elongatum*, but markedly smaller; supraorbital edges apparently rather less developed; posterior palatal opening more narrowed and V-shaped, though not so much so as in *Ph. discolor*; basioccipital rather more deeply pitted.

Teeth as in *Ph. elongatum*, the molars almost as broad, and therefore markedly broader than in *Ph. discolor*. Outer upper incisors rather smaller in proportion.

## Dimensions :—

Forearm of the type 59 millim.

A spirit-specimen (♂) measures: head and body 75; tail 16; nose-leaf, extreme length 17, breadth of horseshoe 8·3, of lancet 8·5; ear 27; tragus, length on inner edge 7·5; forearm 59; third finger, metacarpus 53, first phalanx 16·5, second phalanx 29·5; fifth finger, metacarpus 53, first phalanx 12·5, second phalanx 13·5; lower leg 23; hind foot (c. u.) 15; calcar 19.

Skull of type: greatest length 27·5; basal length 21·5; zygomatic breadth 16; constriction 4·8; front of canine to back of *m.*<sup>3</sup> 10·4.

*Type.* Male. Original number 199. B. M. no. 1. 6. 4. 43.

This is most distinct from either of the two smaller species of *Phyllostoma*, *Ph. elongatum* and *discolor*, and cannot be confused with either of them, though nearest to the former. *Alectops ater*, Gray, said to be from Surinam, has a long tapering nose-leaf to which there is a well-marked rib, just as in *Ph. elongatum*, with which it is united by Dobson.

11. *Hemiderma brevicauda*, Wied.

Six skins and three spirit-specimens. 240, 600, 1000, and 2000 feet. October to December.

12. *Glossophaga soricina*, Pall.

Two in spirit. 600 feet. November.

13. *Artibeus planirostris*, Spix.

Nine skins and two spirit-specimens. 240 feet. October 29.

14. *Artibeus cinereus*, Gerv.

Three skins and one spirit-specimen. 240 feet. November.

15. *Mesophylla Macconnelli*, gen. et sp. nn.

*a.* Skin, ♀. No. 155. November 8. 2000 feet. *Type.*

*b.* Immature, in spirit, ♂. No. 157. November 8. 2000 feet.

MESOPHYLLA, gen. nov. (*Phyllostomidae*).

Allied to *Vampyrops* and *Ectophylla*, but differing from both by the structure of its teeth, and especially its *m*<sub>2</sub>, a tooth diagnostic in this group, and in addition from *Vampyrops* by



its *Ectophylla*-like general characters and tooth-proportions, and from *Ectophylla* by the presence of an  $m_3$ .

Nose-leaf not peculiar, about as in *Vampyrops*, but with a minute secondary leaflet behind the main leaf on the top of the muzzle in the middle line. Ears with a supplementary lobule on the antitragus, otherwise normal. Interfemoral membrane of medium development ; no trace of a tail.

Skull very much as in *Ectophylla* \*, but the basioccipital not deeply pitted. Nasal openings and palatal bones of normal extension, but the palate with many minute vacuities.

*Teeth above.* Incisors very small, not touching each other, the median ones convergent terminally. Canines and premolars also very small and pointed, closely similar to those of *Ectophylla*. Molars very peculiar, in that the anterior one is small, much smaller than the posterior, and triangular, its shape recalling that of the carnassial premolar of a carnivore, and quite unlike the transversely produced  $m^1$  of *Vampyrops*;  $m^2$  rounded, basin-shaped, without trace of interior cusp, a single large antero-external cusp present.

*Teeth below.* Incisors four in number, subequal. Premolars small, not touching each other, though the anterior pair are pressed close against the canines, each with a single main anterior cusp and a long posterior keel without cusp. Anterior molar with one long antero-external cusp and a low postero-external raised edge, its surface broad and hollowed, without further cusps. Second molar rather longer than the first, oval in section, pointed anteriorly, broadly basin-shaped, though not so much so as in *Ectophylla*, and without interior basal cusps: its edges are raised up into cusps at its anterior point, where the highest cusp is placed, antero-interiorly and postero-interiorly; these cusps appear to correspond respectively to the supplementary median anterior, the antero-internal, and the postero-internal cusps of *Vampyrops*, there being no trace of the large antero-external cusp. Last molar minute, about the size of one of the incisors.

This highly interesting genus appears to be a modification of *Vampyrops* in the direction of *Ectophylla*, having a considerable resemblance to the latter form, but without its highly specialized  $m_2$ , and with the dental formula of the former. None of the different subgenera of *Vampyrops* show any special affinity to it, all of them, whatever their dental formula, having the characteristic quadrangular  $m_2$  with a marked cusp at its antero-external as well as at its two internal angles.

\* Cf. Harrison Allen, Tr. Am. Phil. Soc. xix. p. 267 (1898).

*Mesophylla Macconnelli*, sp. n.

Size a little greater than in *Ectophylla alba*. Fur close and thick, hairs about 5 millim. long on the back. Colour of head and anterior back dull brownish white, darkening posteriorly to a brown very near Ridgway's "wood-brown." Fur of body extending on to the basal half of the forearms and femora, and on to the wing-membrane between them. Nose-leaf of medium size, not crenulated or specially complicated; the horseshoe narrow, free in front; lancet with well-defined median rib. Ears with a small rounded basal lappet on the inner edge, which above is markedly convex halfway towards the rounded tip; outer edge concave above, then convex to the antitragal notch; antitragus low, convex above, with a well-defined supplementary upright lobule near its anterior end; tragus pointed above, two projecting lobules on its external border, a peculiar thickened projection placed just in front of the tragus and almost duplicating it. Wings to the distal end of the metatarsus. Calcars short, curved backwards. Interfemoral membrane fairly broad, its narrowest point opposite the middle of the tibiæ.

Dimensions of the type:—

Forearm 30 millim.

Head and body (taken in flesh by collector) 45; ear (do.) 12·5; expanse (do.) 241; third finger, metacarpal 28, first phalanx 11·8, second phalanx 14; fifth finger, metacarpal 27·5, first phalanx 8, second phalanx 8. The following supplementary measures are taken on specimen *b*, in spirit, its forearm being 27·5 millim.:—ear 11·3; tragus on inner edge 3; nose-leaf  $9 \times 5\cdot5$ ; lower leg 10; breadth of interfemoral in centre 6·5.

Skull (of type): greatest length 17·6; basal length 13·5; zygomatic breadth 10; interorbital breadth 4·5; mastoid breadth 9; palate length 8; front of upper canine to back of  $m^2$  6·1.

This curious little bat was at first supposed to be a second species of the genus *Ectophylla*, but further examination resulted in the discovery of so many points of difference, that I have felt compelled to describe it as a distinct genus. As being the most interesting animal obtained by Mr. Quelch, I have named it in honour of the naturalist who was generous enough to provide the means for Mr. Quelch's expedition, and to give the whole of his mammal collection to the National Museum.

16. *Canis cancrivorus savannarum*, subsp. n.

$\alpha$ . Ad. ♀. No. 230. December 10. Altitude 500 feet.  
 "On Savannah." *Type*.

A small delicately-built race of the true *C. cancrivorus*.

Size, of an adult female, markedly less than in the corresponding sex of *C. cancrivorus*. General colour above coarsely grizzled grey with a strong suffusion of buffy, and freely washed with black along the middle line. The long hairs of the back are black for their basal, middle, and terminal fifths, with white subbasal and subterminal rings, though the subbasal ring is sometimes obsolete. The woolly fur is buffy, duller and tipped with brown along the back, clearer and untipped on the sides. Face buffy fawn, with indistinct darker markings at the roots of the whiskers and below the eyes; forehead and crown more greyish, with a lighter patch above each eye. Outer side of ear pale brown, passing basally and on the large postauricular patch into clear buffy. Chin brown; throat, chest, and belly white, varied with buffy on the sides and across between the fore limbs. Front and outer side of fore limbs grizzled greyish buffy; inner side clearer buffy to the wrist, the middle line of the palm dark brown. Hind limbs similarly coloured, the whole of the plantar surface blackish brown. Tail bushy, the hairs of its upperside and its tip black basally, white mesially, and with a broad black end. Below the hairs are dull whitish buffy throughout.

Skull, on the whole, closely similar to that of *C. cancrivorus*, but smaller, more lightly built, and the zygomatic outline more tapering forward in the region of the orbits. Nasals decidedly shorter, barely reaching past the level of the anterior edge of the orbit, and falling considerably short of the premaxillary processes.

Dimensions of the type (taken in the flesh):—

Head and body 610 millim.; tail 280; hind foot (s. u.), dry, 116; ear 63.

Skull: greatest length in middle line 129; basal length 120; zygomatic breadth 70; nasals (from bottom of concavity in front)  $38 \times 10$ ; interorbital breadth 23.3; breadth across postorbital processes 35; breadth of brain-case 44; palate, length 63, breadth across  $m^1$  39; horizontal length of  $p^4$  12.2, of  $m^1$  and  $m^2$  combined 16.5; of  $m_1$  14.2,  $m_2$  8.8,  $m_3$  4.

This appears to be a small and brightly-coloured Savannah representative of the *Canis cancrivorus* of the Guianan coastlands.

17. *Sciurus Quelchii*, sp. n.

Three skins. 240 to 300 feet. November and December.

An olive-coloured species, with a yellow belly and four pairs of mammae.

General appearance very similar to *S. cuscinus* and *Ingrami*, more olive and less brownish than in the true *S. aestuans*, *Chapmani*, and *quebradensis*. Fur fairly short, though slightly longer than in *S. aestuans*, about 8 millim. in length on the back. General colour above finely grizzled olive, this colour extending over the whole of the upper surface, on the head, and on the outer sides of the limbs, but the hands and feet are more yellowish, especially on the toes. Under surface and inner sides of limbs buffy yellow, the chest nearly pure "cream-buff," though the hairs are slaty basally throughout. Lines of demarcation not sharply defined. Ears of medium length, their fine thinly-scattered hairs fulvous, but these are too fine and too few to give any general fulvous effect. No postauricular patches. Tail mixed black and fulvous, the hairs mostly with three black rings and the tips broadly fulvous; hairs at the end of the tail more entirely black, but still with their extreme tips fulvous. Four pairs of mammae, the most anterior close behind the axillae.

Skull with short abruptly and squarely truncated nasals, not nearly reaching to the back of the premaxillary processes. Postorbital processes short. Molars unusually small.

Dimensions of the type (measured in the flesh):—

Head and body 178 millim.; tail 165; hind foot, s. u. 44, c. u. 47; ear 20.

Skull: greatest length 45; basilar length 34; greatest breadth 27.5; nasals 10.5 × 6.2; interorbital breadth 16; breadth across postorbital processes 22; diastema 11.5; palate length from henselion 18.5; length of palatal foramina 2.7, of upper tooth series 6.8.

Type. Male. No. 1. 6. 4. 66. Collected November 2, 1900.

This squirrel is unexpectedly different from the true *S. aestuans* of Surinam and the Guianan coast-lands. Examples from Demerara and Cayenne, however, representing that form, are clearly different from the present, their darker colour, slenderer form, shorter fur, and especially the deep orange-buffy of their underparts readily separating them from the species found inland. Shaw's "*Myoxus guerlingus*" and Peters's "*Sciurus aestuans*, var. *guianensis*"\*, are both

\* MB. Ak. Berl. 1863, p. 655.



clearly the coast species. *S. quebradensis*, Allen\*, from Cumaná, has also many differences in colour, and possesses only three pairs of mammæ†.

### 18. *Rhipidomys nitela*, sp. n.

*a-f.* Six ad. and imm. skins.

Very similar to *R. venezuelæ*, but markedly smaller.

General external appearance quite as in *R. venezuelæ*, with which it shares the general greyish fawn-colour, sharply defined pure white belly, brown ears, light feet with brown middle line of metapodials, and long, hairy, uniformly brown tail. Fur of these specimens rather shorter (hairs of back about 5 millim. in length), but this may possibly be seasonal.

Skull: similar in shape to that of *R. venezuelæ*, but much smaller throughout, narrower and rather more delicately built. Supraorbital edges square, not heavily ridged. Palatal foramina large, widely open, extending to the level of the first lamina of  $m^1$ .

\* *Sciurus (Guerlinguetus) æstuans quebradensis*, Allen, Bull. Am. Mus. N. H. xii. p. 217 (1899).

† The following squirrel, also presented by Mr. McConnell, may be here described:—

### *Sciurus Macconnelli*, sp. n.

A brownish olivaceous species, near *S. quebradensis*, but with eight mammæ. Fur longer and shaggier than in *S. Quelchii*, the hairs on the back about 11 millim. in length. General colour above grizzled brown, perhaps nearest to Ridgway's "vandyke brown," with an olivaceous tinge. Under surface rich fulvous or orange buffy, richest on the chest; chin and throat greyish; bases of hairs slaty grey; lines of demarcation on sides not defined. Head like body; ears rather short, their colour quite like that of the head; a prominent buffy postauricular patch present. Outer sides of limbs like body, the digits greyer; inner sides washed with fulvous, like that of the belly, but duller and paler. Tail imperfect in the single specimen, but evidently of the same type of coloration as in *S. Quelchii*. Mammæ 8.

Nasals comparatively long, parallel-sided, their outer corners level with the premaxillary processes behind, the middle of their hinder edge projecting angularly forwards.

Dimensions of the type (measured in skin):—

Head and body (c.) 190 millim.; hind foot, s. u. 44, c. u. 48; ear (dry) 17; nasals 14·5 (diagonally)  $\times$  6·4; front of lower premolar to tip of incisors 13·5.

*Hab.* Mt. Roraima, near its base.

*Type.* B.M. no. 1.1.28.1. Collected October 1, 1898, and presented by F. V. McConnell, Esq.

This species has somewhat the appearance of *S. quebradensis*, but may readily be distinguished by its possession of eight mammæ, as in *S. Quelchii*, from which it differs by its shaggier fur, browner colour above and more fulvous below; it is also distinguished from all its neighbours by its marked postauricular patches.

Dimensions of the type (measured in the flesh) :—

Head and body 133 millim.; tail 140; hind foot, s. u. 25, c. u. 26; ear 16.

Skull: greatest length 32; basilar length 25.5; greatest breadth 16.6; nasals  $10.8 \times 3.4$ ; interorbital breadth 4.5; interparietal  $4 \times 10$ ; palate from henselion 12.9; diastema 8; palatal foramina  $6.8 \times 2.5$ ; length of upper molar series 4.4.

Type. Male. B.M. no. 1. 6. 4. 81. From Kwaimattat, Kanuku Mts. Collected October 12.

Although so closely similar to *R. venezuelæ* in colour and all essential characters, this species may be readily distinguished by its much smaller size, as shown by the above dimensions. With the other two Guianan species, *R. Macconnelli*, de Wint., and *R. Sclateri*, Thos., it has no near relationship.

### 19. *Holochilus guianæ*, sp. n.

*α-d.* Four ad. and imm. skins. November 28, 1900.

*α.* No. 179 the type.

A middle-sized species allied to *H. sciureus*, from whose locality it is separated by the range of the Amazonian *H. nanus*.

General colour of head and body grizzled greyish fawn, profusely mixed with blackish along the dorsal area. Sides gradually clearing and verging towards buffy cinnamon along the flanks; in some of the younger specimens this part is almost ochraceous buff. Belly not sharply defined, the longer hairs cinnamon or buffy, the woolly hairs slaty basally, dull white terminally; chin and inguinal regions entirely whitish, owing to the absence of the longer hairs. Ears short, blackish externally, buffy internally. Arms and legs like body; hands and feet glossy buffy white on the metapodials, clearer white on the digits. The feet themselves appear to be longer in proportion to the size of the skull than in *H. sciureus*. Tail shorter than head and body, finely scaly, thinly clothed with fine brownish hairs, the scales showing through; uniformly brown above, rather paler below.

Skull as compared with that of Bahian specimens assigned to *H. sciureus* lighter and more delicately built throughout, less heavily ridged, with a narrower muzzle and more slender zygomata. Interorbital region flat, its edges square, not produced into heavy upstanding ridges as in *H. sciureus*. Front of anterior zygoma-root with a marked projection above, below which the edge is concave forwards. Palatine

foramina about the length of the molar series, not reaching back to the front of  $m^1$ . Molars light and narrow, of the usual *Holochilus* pattern.

Dimensions of the type (measured by collector in the flesh) :—

Head and body 178 millim.; tail 159; hind foot, s. u. 38·5, c. u. 42; ear 15.

Skull: greatest length 37; basilar length 30·7; greatest breadth 20·6; nasals 14·5 × 4·5; interorbital breadth 5; palate from henselion 18·7; palatal foramina 7·5 × 2·6; length of upper molar series 6·9.

*Type.* B.M. no. 1. 6. 4. 87.

This water-rat, whose discovery extends the known range of the genus some way to the northward, is no doubt very closely allied to *H. sciureus*, but differs from it by its darker colour (Wagner says that in his type “fehlt eine schwarze Beimischung ganz”) and by the more lighter build and less ridged skull. *H. nanus*, the smallest species of the genus, occurs in the Amazonian valley, and divides the ranges of the other two.

## 20. *Sigmomys* \* *savannarum*, sp. n.

Fourteen skins. 240 feet. October and November. “On Savannahs.”

Allied to *S. Alstoni*, Thos.†, and similarly like a *Sigmodon*, but paler in colour, with shorter foot and shorter skull.

Size rather less than in *S. Alstoni*. Fur straight and sparse, with little or no underfur; hairs of back about 10 millim. in length. General colour above heavily lined and mottled brown and greyish buffy, the combination not easily definable, but perhaps nearest to Ridgway’s “broccoli-

\* Genus novum. Type “*Reithrodon*” *Alstoni*, Thos. P. Z. S. 1880, p. 691.

The many differences that distinguished *R. Alstoni* from the true *Reithrodons* were detailed when the species was described. Further consideration and much further material render it clear that the *Alstoni* group, *Sigmodon*-like in external appearance, in skull, and in dentition, should be separated generically from the true *Reithrodon*. In distinguishing *Sigmomys* emphasis may be laid on the evenly tapering cranial outline, the broad short molars, the deep well-defined pterygoid fossæ, and on the number of the mammæ, there being, as in *Sigmodon*, 10 at least, as against 8 in *Reithrodon*. Altogether it seems probable that this form is rather a grooved-toothed *Sigmodon* than any close relation to *Reithrodon*.

† This species was described on a spirit-specimen from “Venezuela” collected many years before by Mr. Dyson. But an excellent series of skins, agreeing closely with the type, was recently received from Cumaná, so that that may now be looked upon as the typical locality.

brown." On the rump the buffy becomes rather clearer. Top of head like back; sides of nose with a distinct buffy-yellow spot; eyes surrounded by a prominent whitish ring. Hairs of ears brown externally, yellowish internally, but without marked contrasts. Under surface soiled whitish or buffy, not sharply defined, the bases of the hairs slaty, the tips either white or buffy, the variation in this respect being considerable, as is also the case in *S. Alstoni*; hairs of throat and groin whitish to their roots. Front of arms like body, inner sides whitish; hands and wrists dull whitish; hind limbs similar in colour, but the inner side of the leg is nearly or quite naked; fifth hind toe as in *S. Alstoni*, but little longer than first, and falling short of the base of the fourth. Tail about as long as the body without the head, well haired, brownish above, white below for its whole length.

Skull quite similar to that of *S. Alstoni* in general structure, but shorter and perhaps rather broader in proportion.

Dimensions of the type (measured in the flesh):—

Head and body 133 millim.; tail 95; hind foot, s. u. 25, c. u. 27; ear 19.

Skull: greatest length 32; basilar length 26; greatest breadth 19; nasals  $11.5 \times 4$ ; interorbital breadth 4.5; palate from henselion 13.8; diastema 8.2; palatal foramina  $7 \times 2.4$ ; length of upper molar series 5.3.

Type. Male. B.M. no. 1. 6. 4. 100. Original number 51. Killed October 18, 1900.

This species is readily distinguished by its shorter skull and lighter colour from *S. Alstoni*, to which alone it is allied and with which it forms a special group.

## 21. *Oryzomys navus messorius*, subsp. n.

Six skins and two spirit-specimens.

Close to *Oryzomys (Oligoryzomys) navus*, Bangs, of which it appears to form a geographical race.

General colour above grizzled greyish fawn, varying towards rufous; rump more rufous than back. Face greyer. Ears comparatively short, but little darker than the general colour of the head, very different therefore to the blackish ears of *O. fulvescens* and *costaricensis*. Under surface dull whitish, with scarcely a trace of buffy, not sharply defined laterally; the hairs all greyish basally. Hands and feet white. Tail short for this group, thinly haired, brown above, lighter beneath; not so sharply contrasted as in *O. fulvescens*.

Skull as usual in this group.



Dimensions of the type (measured in the flesh) :—

Head and body 82 millim.; tail 95; hind foot, s. u. 21, c. u. 22; ear 12·5.

Skull: greatest length 22·5; basilar length 16·4; greatest breadth 12; length of nasals 8; interorbital breadth 3·6; palatal foramina  $4·1 \times 2$ ; length of upper molar series 3·1.

Type. Female. B.M. no. 1. 6. 4. 97. Collected November 29th.

This local representative of the *Oligoryzomys* group seems to differ from *O. navus*, the only form which is not geographically very remote, by its shorter tail and slightly different colour, and no doubt represents a tenable subspecies. It is not improbable that *O. fulvescens*, *O. navus*, *O. costaricensis*, and perhaps other described forms will all prove to be local subspecies of one widely-spread species.

## 22. *Zygodontomys stellæ*, Thos.

Twelve skins. 240 and 500 feet. October to December. Evidently the commonest rat of the region.

## 23. *Proechimys cayennensis*, Desm.

Six skins of different ages. 240 and 500 feet. November and December.

Without topotypes of *P. cayennensis* I cannot be certain of the determination of these specimens. They are certainly very different from the Brazilian forms referred to *cayennensis* by Waterhouse, but geographically are likely enough to be Desmarest's species. They are of the same rufous group as *P. Cherrii*, *Urichi*, *trinitatis*, and other north-western species of the genus.

## 24. *Cavia porcellus guianæ*, subsp. n.

Four skins of different ages from the Kanuku Mountains, 7th and 8th December, 600 feet, and one from Berbice, on the coast.

Similar in general characters to the typical Brazilian form, but much paler and greyer above and less deeply buffy below.

Size, character of fur, &c. as in the typical form. General colour above grey (near the "olive-grey" of Ridgway), heavily grizzled and lined with black, this latter colour predominating on the posterior dorsal area, while the head, neck, shoulders, flanks, and rump are of the clearer greyish. The light constituent of the general grey varies in different specimens from whitish towards buffy. Under surface whitish or slightly buffy, the bases of the hairs slaty grey; the usual

dark collar of the same grey as the sides. Eyes with indistinct whitish rings. Ears thinly haired, whitish. Limbs grizzled grey like body, lightening to nearly white on the fingers and toes.

Skull and teeth not definably different from those of the true *C. porcellus*.

Dimensions of the type :—

Head and body 275 millim.; hind foot, s. u. 43, c. u. 46; ear 19.

Skull: greatest length 59; basilar length 49; greatest breadth 35·5; nasals 22 × 9; palate 28; diastema 17; length of molar series (alveoli) 14·5.

*Type.* Male. B.M. no. 1. 6. 4. 120. Killed 7th December, 1900.

The difference in colour between this Guianan cavy and the Brazilian one is very considerable, but there is a striking agreement in other characters.

### 25. *Myrmecophaga jubata*, L.

Mount Roraima, 5000 feet.

### 26. *Didelphis marsupialis*, L.

Three skins.

There appears to be no difference between these specimens and skins from the coast-region of Demerara.

In spite of the arguments brought forward by Dr. Allen in his most recent publication on the subject, I still think that the Guianan opossum should be regarded as the type form of Linnæus's *D. marsupialis*.

The evidence of the sixth edition of the 'Systema,' where Seba, and Seba only, is quoted, shows what animal Linnæus had in his mind when speaking of *D. marsupialis*. The interesting fact, to which Dr. Gill has drawn my attention, that Linnæus worked under Seba in arranging the latter's collection, adds weight to what we find in his works as to the importance of the Seba collection in the preparation of his arrangement of the species of *Didelphis*.

### 27. *Metachirus opossum*, L.

One skin from the Rupununi River, 27th September, 200 feet, and four from the Kanuku Mountains, 300 and 600 feet, November and December.

### 28. *Metachirus nudicaudatus*, Geoff.

Two skins, unfortunately both quite young. 6th December. 600 feet.

29. *Marmosa Klagesi*, Allen.

Skin. No. 120. 240 feet. 29th October, 1900.

I have fortunately been able to compare this opossum with one of Dr. Allen's original specimens from Ciudad Bolivar brought over by him. Mr. Quelch's specimen is younger, and therefore smaller, but there is no difference between the two which might not be explainable by age. *M. Robinsoni*, Bangs\*, is also no doubt closely allied.

This identification is another indication of the faunal affinity between the Lower Orinoco and the Kanuku Mountains.

XXII.—*List of small Mammals obtained by Mr. A. E. Pease, M.P., during his recent Expedition to Abyssinia, with Descriptions of Three new Forms of Macroscelides.* By  
OLDFIELD THOMAS, F.R.S.

IN the course of a sporting expedition through Abyssinia during the past winter Mr. A. E. Pease collected a number of small mammals which, in addition to some heads and horns of larger animals, he has been good enough to present to the National Museum. Among them is a new *Macroscelides*, and in describing it I have taken the opportunity to describe two other members of that genus in the Museum collection.

There are also examples of the rare and interesting species *Dendromys Lovati* and *Lophuromys flavopunctatus*.

1. *Macroscelides Peasei*, sp. n.

a. ♂. Hoolul, Abyssinia, 4000 feet. December 2, 1900.  
*Type* (B.M. no. 1. 7. 6. 1).

Most closely allied to *M. pulcher*, Thos., but greyer in colour.

Size and general characters very much as in *M. pulcher*. Fur about 9–10 millim. in length on the back. General colour above a soft vinaceous grey, resembling to a certain extent Ridgway's "vinaceous buff," distinctly paler than in *M. pulcher*; the dorsal area is more vinaceous and the flanks more grey. Viewed from behind the colour is a paler edition of Ridgway's "ecru drab." Muzzle grey, the dorsal dark line well marked; crown like back. Light orbital rings narrower than in *M. pulcher*; light and dark patches behind eye larger and less intensely contrasted than in *M. pulcher*.

\* P. Biol. Soc. Wash. xii. p. 95 (1898).

Ears large, with well-marked postauricular fulvous patches. Metatragus low, simple, triangular. Hairs round naked pygal patch tipped with fulvous. Under surface pure white, not sharply defined, the bases of the hair everywhere slaty grey. Hands and feet white. Tail thinly haired, brown above, whiter below.

Skull and dentition closely similar to those of *M. pulcher*. Upper canines unicuspid, but this character seems variable.

Dimensions of the type (measured in the flesh):—

Head and body 130 millim.; tail 130; hind foot (s. u.) 35; ear 24.

Skull: greatest length 38; basal length 32·6; greatest breadth 21·3; length of nasals 13·8; interorbital breadth 5·8; breadth of brain-case 15·2; palate length 19·5; length of upper tooth-row 18·1.

This species differs from *M. pulcher* by its paler colour and the more diffuse character of its postocular markings\*.

\* In working out this *Macroscelides* the three specimens obtained by Lord Delamere have been more closely examined. Two of them may still continue to bear the name *pulcher*, but the third seems to represent a new form, which may be called

*Macroscelides Delamerei*, sp. n.

Allied to *M. pulcher*, but without postocular markings.

Size rather less than in *M. pulcher*. General colour pale vinaceous grey, intermediate between *M. pulcher* and *Peasei*. Muzzle greyish, the mesial dark line scarcely perceptible. White orbital rings present, but no black and white postocular markings, the white rings incomplete behind, but the gap not darkened, nor is there any posterior extension of the white. Ears as in *M. Peasei*, but the metatragus rather higher and the postauricular patches paler and less prominent. Colour of under surface, of hands, feet, and tail as above described in *M. Peasei*.

Skull as in *M. Peasei*, but smaller throughout. Upper canines bicuspid.

Dimensions of the type (measured in the flesh):—

Head and body 110 millim.; tail 100; hind foot (s. u.) 29; ear 20.

Skull: basal length 31·3; greatest breadth 20; length of nasals 12; interorbital breadth 5·6; breadth of brain-case 15·5; palate length 18·6; length of upper tooth-row 18.

*Hab.* Athi River, British East Africa, alt. 6000 feet.

*Type.* Female. B.M. no. O. 6. 21. 4. Collected November 18, 1899, and presented by Lord Delamere. "Caught on open grass-land. Native name *Enderrone*."

I may also take this opportunity to describe

*Macroscelides Rozeti deserti*, subsp. n.

Essential characters, size, proportions of ears and tail, absence of eye-markings, and other details as in the true *M. Rozeti*, but the general colour is a sandy desert colour, something like Ridgway's "pinkish buff," but with a slightly vinaceous tone in it. Postauricular region and flanks clear buffy.

On the other hand, an example from Oran, therefore a topotype of



2. *Dendromys Lovati*, de Wint.

a. ♂. Addis Abeba, 8000 feet. January 13, 1901.

Since the first description of this rare and beautiful tree-mouse, the British Museum has received a perfect specimen of it in spirit from Capt. Harrington, the British Resident in Abyssinia.

3. *Mus macrolepis*, Sund.

a. ♂. Balchi, Abyssinia, 7000 feet. December 27, 1900.

4. *Mus albipes*, Rüpp.

a, b. ♂ ♀. Lake Zuai. February 6, 1901.

This is the long-tailed species with  $3-2=10$  mammæ, the preceding one being multimammate, with a comparatively short tail.

5. *Arvicanthis abyssinicus*, Rüpp.

a, b. ♀ & young. Lake Zuai. February 5, 1901.

6. *Lophuromys flavopunctatus*, Thos.

a. ♂. Lake Zuai. February 5, 1901.

7. *Leggada minutoides*, Smith.

a. Harar. November 22, 1900.

8. *Pectinator Spekei*, Bly.

a. ♂. Lasmahan, Somali, 1500 feet. November 12, 1900.

*M. Rozeti*, is very near Ridgway's "ecru drab," and consequently very different from the Biskra form. Indeed, the difference is so great that I should have considered the latter as a separate species, had it not been for the probability that an intermediate coloration will be found in the intervening districts.

Dimensions of the type (measured in the flesh):—

Head and body 97 millim.; tail 113; hind foot 32; ear 28.

Skull: basal length 28.5; greatest breadth 19.5; interorbital breadth 6.2; length of upper tooth-row 17.3.

*Hab.* Near Djebel Bourzel, Biskra.

*Type.* Female. B.M. no. 97. 6. 9. 2. Collected March 10, 1897, and presented by the Rev. A. E. Eaton.

Five specimens examined, four obtained by Mr. Eaton, the fifth by Sir Edmund Loder.

XXIII.—Description of a new Species of Chloritis from the Loo-Choo Islands. By G. K. GUDE, F.Z.S.

*Chloritis* (s. s.) *oshimana*, sp. n.

Shell narrowly but deeply umbilicated, discoid, dark corneous brown. Spire flattened, apex sunk below the level of the spire, suture deep. Whorls  $4\frac{1}{2}$ , convex, increasing rather rapidly, the last twice as wide as the penultimate, descending rather deeply in front and suddenly widened towards the mouth; the embryonal  $1\frac{1}{2}$  whorls smooth, the last 3 densely covered with stiff, persistent, golden-brown hairs disposed in oblique rows at right angles to the lines of growth; the spaces between the rows densely papillate. Aperture oblique, obovate. Peristome thickened and shortly reflected, fuscous; margins approaching, united by a raised flexuous ridge; parietal callus densely covered with horizontal rows of papillæ; upper margin ascending shortly at first, then descending, straight; outer margin rounded, basal straight; columellar straight, forming an obtuse angle with basal, slightly dilated over the narrow deep umbilicus. Inside the mouth occurs an elongated swelling just behind the peristome, and corresponding with it a well-defined pit at the base of the shell near the junction of the basal and columellar margins.

Diam. maj. 19·5, min. 16 ; alt. 10 mm.

„ 17·5, „ 14·5; „ 9·5 „

„ 15·5, „ 13 ; „ 7 „

*Hab.* Oshima, Loo-Choo Isles. Type in my collection. (Mr. Hirase, no. 354.)

*Chloritis oshimana* resembles *C. cheratomorpha*, Tap., from New Guinea, but it is smaller and the apex is not so deeply sunk; the aperture is more oblique and the hairs are longer and much more sparsely distributed. The smallest specimen



*Chloritis oshimana*: figs. 1-3, three different views; fig. 4, transverse section of spire, showing the sunken apex.

is more depressed than the others, and the swelling inside the aperture with the corresponding pit outside is almost obsolete. Four specimens were received.

This new species extends the range of the genus *Chloritis*, no species having hitherto been recorded from this group. The habitat is recorded by Mr. Hirase as Oshima, prov. Osumi. The island Oshima, although politically united to the province of Osumi in Southern Kiusiu, belongs geographically to the Loo-Choo Islands. The same remarks apply to the island Kikai, which has recently misled Mr. C. F. Ancey \* to include two Loo-Choo shells—*Eulota despecta* and *E. connivens*—in the Japanese fauna.

#### BIBLIOGRAPHICAL NOTICE.

*Cours de Botanique*:—*Anatomie ; Physiologie ; Classification ; Applications agricoles, industrielles, médicales ; Morphologie expérimentale ; Géographie botanique ; Paléontologie ; Historique*. Par MM. GASTON BONNIER et LECLERC DU SABLON. À l'usage des Élèves des Universités, des Écoles de Médecine et de Pharmacie, et des Écoles d'Agriculture. Tome premier, Fascicule I. Paris: Jules Peelman, 1901. 8vo. Pp. 1-384.

THIS is the first instalment of a work whose extent may be gauged by the title above cited. The entire work will extend to about 2500 pages, with more than 3000 figures, mostly drawn from nature, and to be concluded in the year 1903.

We always open a new French introduction with interest, for though it seems hard to present a new face to a well-worn theme, yet we usually find some detail of interest conspicuously brought into prominence. It is so here, though the particular feature seems more adapted to the wants of a private student destitute of the help of a teacher; yet the use of it may be recommended in the case even of a student in a well-appointed laboratory under a competent teacher. The plan indicated is that of giving a *résumé* at the end of a chapter or section, which will re-direct the pupil's attention to points which must not be overlooked.

After some preliminary generalities the authors proceed to deal with the Morphology of the Angiosperms, the Stem and Root being here given, and the consideration of the Flower and Fruit will be taken up in the succeeding fasciculus. The scheme then is to give an account of the Angiosperms in general, the Gymnosperms, and Cryptogams, after which are to come Physiology, Experimental Morphology, Geographic Botany, Palæontology, concluding with a section on Evolution.

In working out this plan the authors take certain types in each section and explain their structure, taking care to employ common plants, so as to permit the student to readily follow the description with the type before him. Thus, in the Leaf the types selected are Buttercup, *Veronica*, *Narcissus Tazetta*, and *Arundo Donax*.

We shall be glad to see the continuation of this attractive volume.

\* Journ. de Conchyl. xlix. (1901) pp. 141, 142.

## PROCEEDINGS OF LEARNED SOCIETIES.

## GEOLOGICAL SOCIETY.

February 6th, 1901.—J. J. H. Teall, Esq., M.A., F.R.S.,  
President, in the Chair.

The following communication was read:—

‘On the Structure and Affinities of the Rhætic Plant *Naiadita*.’  
By Miss Igerna B. J. Sollas, B.Sc., Newnham College, Cambridge.

This plant, the remains of which are found in Gloucestershire, was considered to be a monocotyledon by Buckman, but a moss by Starkie Gardner. Material supplied by Mr. Seward and Mr. Wickes has given the Authoress ground for the belief that *Naiadita* is an aquatic lycopod, and that it is the earliest recorded example of a fossil member of the Lycopodiaceæ, resembling in proportions and outward morphology the existing representatives of the group. The specimens described show stems, leaves, and sporangia which appear to be borne laterally on the stem and to be embraced by the bases of the leaves. Stomata do not appear to occur, and the association of leaves of different types leads to the conclusion that the three described species are in reality but one. The stems consist mainly of long, thin-walled tubes covered with an epidermis of long rectangular cells; the leaves, in vertical section, show only a single layer of complete cells. The absence of stomata and cortical tissue may be explained, if the plant was submerged when living; but it is possible that the lower tissues of the leaf are lost, together with any stomata which may have been present.

May 22nd, 1901.—J. J. H. Teall, Esq., M.A., F.R.S.,  
President, in the Chair.

Mr. GEORGE ABBOTT, in exhibiting some specimens of Cellular Limestone from the Permian beds at Fulwell, Sunderland, which he proposed to present to the British Museum (Natural History), remarked that their interest depended upon the assumption that they were entirely inorganic. Although showing a remarkable resemblance to corals, yet no zoologist or geologist had yet claimed them as organic. If this surmise were correct, the carbonate-of-lime-molecules—probably when amorphous—must have had some inherent molecular directive force which produced the numerous distinct patterns in their structure. These fall into four distinct classes:—honeycomb (two kinds), coralloid, and pseudo-organic, the last-named being remarkable for having a constant discoidal shape, and therefore those of this class must have had their external form also controlled by the hypothecated force. Each class appears to have passed through four stages of



'growth' and to have undergone some marvellous rearrangements of the particles while in the solid condition. So far as he knew, no one had previously attempted to classify the different patterns, nor had anyone, except Mr. Wickham King, in his work on 'Permian Fossils,' offered any theory as to the formation of this cellular structure in the Magnesian Limestone.

The following communication was read:—

'On the Skull of a Chiru-like Antelope from the Ossiferous Deposits of Hundes (Tibet).' By Richard Lydekker, Esq.

Twenty years ago the Author proposed the provisional name of *Pantholops hundesiensis* for an extinct species of antelope typified by an imperfect skull figured in Royle's 'Botany etc. of the Himalaya Mountains,' pl. iii, fig. 1. The specimen is in the Museum of the Geological Society, and an examination has confirmed the original determination. The skull, although of rather smaller dimensions, comes very close to that of the existing chiru (*Pantholops Hodgsoni*) of Tibet in general form of brain-case, in the strong ridges marking the upper limits of the temporal fossæ, and in the contour of the occipital surface. The horn-cores have the same highly elliptical cross-section, and the same general setting-on and upright direction. The fossil apparently came from the horizontal deposits of Hundes, and its age is probably not greater than Upper Pliocene.

#### MISCELLANEOUS.

*On Apus and Branchipus from Armenia.* By H. O. CAVALIER.

MR. FELIX OSWALD recently collected some specimens of *Apus cancriformis* and *Branchipus stagnalis* in some pools on the Bingöl Dag, in Armenia, at a height of 10,000 feet; they are now in the British Museum, where, through the kindness of Professor F. Jeffrey Bell, I have had an opportunity of examining them. It is interesting that the proportion of males is unusually large: of *Apus* there is one male and one female, of *Branchipus* two males and six females.

As Crustacea at such heights are rarely discovered, I think it worthy of record that these are practically identical with the common European species, though this is only in accordance with the results of Grube\* on *Apus* from Lake Baikal and of Gaerstaecker† on the Siberian *Branchipus*; but there are some slight differences in the appendages. When sufficient material has been collected a table of the variations of Crustacea at different altitudes may be of considerable interest.

\* Jahres-Bericht schl. Gesell. 1872, p. 53.

† Bronn, 'Crustacea,' p. 1062.

*Voluta Smithi*, new Name to replace that of *V. uniplicata* (pre-occupied). By G. B. SOWERBY, F.L.S.

Since the publication of the description of this remarkable Japanese species in the Ann. & Mag. Nat. Hist. ser. 7, vol. v. (May 1900), Mr. Edgar A. Smith has kindly pointed out to me that the name I applied to it—*Voluta uniplicata*—had been used as far back as 1850 by a member of my family, James de Carl Sowerby, for a fossil species from the Middle Eocene of Bracklesham Bay. It is therefore necessary to alter the name of the last published, which I now propose to call *V. Smithi*, in honour of the eminent conchologist who has so opportunely called my attention to the error, caused by inadvertance, and enabled me to rectify it.

*Dates of Publication of the Zoological and Botanical portions of some French Voyages.*—Part II. Ferret and Galinier's '*Voyage en Abyssinie*'; Lefebvre's '*Voyage en Abyssinie*'; '*Exploration scientifique de l'Algérie*'; Castelnau's '*Amérique du Sud*'; Dumont d'Urville's '*Voyage de l'Astrolabe*'; Laplace's '*Voyage sur la Favorite*'; Jacquemont's '*Voyage dans l'Inde*'; Tréhouart's '*Commission scientifique d'Islande*'; Cailliaud, '*Voyage à Méroé*'; '*Expédition scientifique de Morée*'; Fabre, '*Commission scientifique du Nord*'; Du Petit-Thouars, '*Voyage de la Vénus*'; and on the Dates of the '*Faune Française*.' By C. DAVIES SHERBORN, F.Z.S., and B. B. WOODWARD, F.L.S. &c.

'*Voyage en Abyssinie, dans les Provinces du Tigre, du Samen et de l'Amhara . . . par MM. FERRET et GALINIER.*' [1839-43.]

Vol. III. Descript. géologique &c.  
 Catal. des Roches, &c. By Rivière.  
 Plantes. By Raffeneau Delile.  
 Mammifères. By F. E. Guérin-Méneville.  
 Oiseaux. By Guérin-M. & De La-Fresnaie.  
 Entomologie. By Reiche.

The first portion of vol. iii. appeared in 1847; this we consider to be up to p. 84 (the geology); the plants, mammals, and part of the birds (up to p. 224) we consider to date from 1848; p. 227 refers to 1847, pp. 229 and 231 refer to Lefebvre's '*Voyage en Abyssinie*,' p. 110 (=1847), and p. 256 bears a date 1850: it is therefore reasonable to accept 1850 (not Hagen's 1849) as the date of pp. 225-536. See also Wiegmann. Arch. 1851, ii. 153. Guérin, in the "*Insectes*" of Lefebvre's '*Voy. en Abyss.*,' says on p. 254 that Reiche's specific names quoted in this (Guérin's) work were still in MS. on 30 Aug. 1846.

‘ Voyage en Abyssinie exécuté pendant . . . 1839-43 . . . par une Commission scientifique composée, &c.’ (Lefebvre’s).

Pt. III. Tom. IV. & V. Hist. Nat., Botanique. Par Richard.

Tom. IV. 16 $\frac{3}{4}$  sheets=pp. i-xi, 1-254. Bibl. Franç. 22. v. **1847**; the 1846 of Wieg. Arch. 1847, ii. 296, would seem to be an error.

3 = 255-304. Bibl. Franç. 15. i. **1848**.

12 $\frac{1}{2}$  = 305-end. Bibl. Franç. 26. ii. **1848**.

Tom. V. There is no clue to t. v. Pritzel says 1850, Jackson says 1851. The T.P. and wrapper give no date; the last p. of the wrapper says the work came out in 12 livraisons of text=6 vols. Perhaps both Pritzel and Jackson are right, and the first half came out in 1850 and the second in 1851.

Pt. IV. Tom. VI. Hist. Nat., Zoologie.

Mammals and Birds, by Des Murs & Prévost; Reptiles and Fishes by Guichenot; Insects, by Guérin-Ménéville.

Tom. vi. was begun in **1847** (‘ Appendice aux Mammifères, &c.’), and we consider pp. 1-174 to belong to that date. The ‘ Appendice ’ refers to 1848 on the second page, to June 1848 on p. 175\*; the text to the fishes, pp. 223-228, had not appeared in 1850 (Wieg. Arch. 1851, ii. 76), while that of the reptiles was noticed, with a doubt about the date, in 1852 (Wieg. Arch. 1853, ii. 61). The Entomologie came out in **1849** (Wieg. Arch. 1850, ii. 149). Ferret and Galinier, in their *Voy. en Abyssinie, Oiseaux*, p. 256, refer to the Oiseaux of this Voyage as 1850. It will be noticed that ‘ Appendice aux Mammifères, &c.’ (2 pp.), pp. 161\*-176\*, 177-192, 177\*-192\*, are all printed in smaller type and crowded up. This strongly suggests that these pages had been delayed, and space left for them, which proving insufficient, led to this singular muddle in the pagination. We regard these pages as **1851**. The summary is therefore:—

Pp. 1-174. **1847**.

Appendice, 2 pp.+161\*-176\*, 177-192, & 177\*-182\*. **1850**.

Pp. 183\*-192\* & 193-238 [-40]. **1851**.

Pp. 241-398. **1849**.

‘ Exploration scientifique de l’Algérie, pendant . . . 1840-42, &c.’

BOTANIQUE. I. Cryptogamie. By Durieu de Maisonneuve, &c.

Livr. 1-6, pp. 1-240, 36 pls. **1846**. Wieg. Arch. 1847, ii. 453.

7-17, 241-410. ? **1849**. Avis de l’éditeur. (On pp. 294 & 336 the year 1847 is quoted.)

18-20, 411-631. **1869**. Bibl. Franç. 23 Oct. 1869.

II. Phanérogamie. 330 pp.

Sheets 1-15, pp. 1-120. **1855**.

16-30, 121-240. **1856**.

31-end, 241-end & i-cx. **1868**. Bibl. Franç. 25 Jan. 1868.

“ Avis de l’éditeur.—Les Feuilles 1-15, formant la première livraison de ce volume, ont été imprimées d’octobre 1854 à avril 1855.—Les feuilles 16-30, formant la seconde livraison, ont été imprimées d’avril à octobre 1855.—Les feuilles 31 et suivantes, ainsi que celles consacrées à l’introduction, ont été imprimées de janvier à octobre 1867.”

GÉOLOGIE. By Renon. 118 pp. 6 pls. **1848.** Bull. Soc. géol. Fr. [2] vii. 1849, 15.

„ Descr. des Coq. foss. By Deshayes (? published).

ZOOLOGIE. Hist. Nat. des Mollusques. By Deshayes. xx, 609 pp. Atlas, 160, 4 pp., 155 pls.

Plates 9<sup>B</sup>, 38, 76, 88, 91, 120, 122, 127, 128, 129, 131, 132, 133, 136, 137, 138, 140, and 141 were not published (*vide* note by bookseller in copy in Natural History Museum). This portion appears to have been issued in livraisons, each containing 4 or 5 sheets of text and 6 plates. Its publication was suspended at the twenty-fifth livraison by the revolution of February 1848.

No definite clue is as yet obtainable as to the exact dates of issue of these livraisons or their contents. The following represents the state of our knowledge:—

Livr. 1.	5½ sheets.	1845.	Bibl. Fr. 6 Dec. 1845.
1-3.		1845.	
4-9.		1846.	} Wieg. Arch. 1847, ii. 372.
10-20.		?	
21-25.		1848.	Journ. de Conch. sér. iii. tom. xvi. 1876, 124; Rev. Mag. Zool. i. 1849, 628.

The articles on *Gastrochæna* (p. 17 *et seqq.*) and on *Teredo* could not have appeared till 1846, having been read before the Paris Academy and then withdrawn in January of that year for the purposes of this work (Compt. Rend. Acad. Sci. Paris, xxii. 301).

Page 281 is post Nov. 1846, since allusion is there made to a paper of that date (then recently published) by Récluz in Rev. Zool. ix. pp. 424-5.

ZOOLOGIE. Hist. Nat. Anim. Articulés. By Lucas. Pts. 1-3; 403, 590, & 527 pp.

Livr. 1-18. { pp. 1-403 } **1846.** Wieg. Arch. 1847, ii. 70, 118, 196, 202.  
                  { 1-360 }

[Livr. 1, 5 sheets, Bibl. Franç. 28, iii. 1846;  
5 & 6, 10 sheets, *ibid.* 15, viii. 1846.]

361-376. **1847.** Bibl. Franç. 20 Nov. 1847.

“La seconde partie . . . il n’a encore paru que 56 feuilles” (*i. e.* to p. 448), Rev. Zool. 1847 (Nov.), 372; a few spp. came out in **1848**, but there is no record. Wieg. Arch. 1849, p. 121.

“Schluss des zweiten Bandes und der Dritte.” **1849.** Wieg. Arch. 1850, ii. 149, 185, & 242.

The Entom. Soc. France received livraisons 1-12 (in 4to, 1845-1847) in April 1847, livr. 13-18 in Dec. 1847; Lucas told the Society on 13th June, 1847, that he had finished the three volumes. This, however, does not help us any further.

Hist. Nat. des Reptiles. By Guichenot. Livr. 32. **1850.** Wieg. Arch. 1851, ii. 68.

Hist. Nat. des Poissons. By Guichenot. Livr. 37. **1850.** Wieg. Arch. 1851, ii. 76.

Hist. Nat. des Oiseaux. By Loche. 2 vols. **1867.** 309 & 444 pp. 13 pls. by Vaillant, and 1 bis, 9 bis by Werner.

Hist. Nat. des Mammifères. By Loche. **1867.** 123 pp. Pls. 1-5 by Vaillant, 6 & 7 by Werner.

The description of the Mammals and Birds was evidently entrusted in the first instance to M. le Commandant (afterwards Général) Jean Levaillant (cited in Loche’s text as “Levaillant j<sup>or</sup>”), under whose directions the plates, some of which bore new specific



names, were drawn. Some of these plates were issued as early as 1849, being cited in Bonaparte's 'Conspectus Avium,' but no portion of text by Levaillant ever appeared, the first allusion to the new species being in V. Loche's 'Catalogue des Mammifères et des Oiseaux observés en Algérie,' 1858.

FRANCIS DE CASTELNAU. 'Expédition dans les parties centrales de l'Amérique du Sud, &c.'

ZOOLOGIE.

Vols. I. and II. came out in 20 livraisons, the contents of which are printed in the "Table et classification des matières" affixed to each volume. The dates on which the livraisons were received by the Académie Française were:—

Livr. 1-3.	23 July 1855.	Compt. Rend. tom. xli. p. 129.
4-7.	10 Sept. 1855.	" " p. 447.
8-11.	3 Dec. 1855.	" " p. 1027.
12-14.	17 Dec. 1855.	" " p. 1094.
15-18.	30 June, 1856.	" tom. xlii. p. 1275.
19-20.	8 Dec. 1856.	" tom. xliii. p. 1133.

Vol. III. Entomologie. By Lucas. 204 pp. 1859.

Myriapodes, &c. By Gervais. 44 pp. 1859.

Mollusques, &c. By Hupé. 104 pp. 1857.

Livr. 21-25. 30 Nov. 1857. Compt. Rend. tom. xlv. p. 936.

26-28. 7 Mar. 1859. " tom. xlviii. p. 483.

29-30. 10 Oct. 1859. " tom. xlix. p. 516.

Livr. 21-24 contained the Mollusques (12 sheets and 20 pls.), Wieg. Arch. 1858, ii. 493, and appeared in 1857. Myriapodes was published in 1859, Wieg. Arch. 1859, ii. 509; Entomologie in 1859, Wieg. Arch. 1859, ii. 329.

BOTANIQUE. By H. A. Weddell.

Vol. I., livr. 1, pp.	1-24.	16 July, 1855.	Compt. Rend. tom. xli. p. 108.
2,	25-56.	3 Dec. 1855.	" " p. 1027.
3,	57-136.	30 June, 1856.	" tom. xlii. p. 1275.
4-6,	137-184.	15 Dec. 1856.	" tom. xliii. p. 1134.
7,	185-232.	30 Nov. 1857.	" tom. xlv. p. 936.
Vol. II., 8,	1-16.	1 Feb. 1858.	" tom. xlvi. p. 261.
9,	17-72.	7 Mar. 1859.	" tom. xlviii. p. 483.
10 & 11,	73-112.	10 Oct. 1859.	" tom. xlix. p. 516.
12 & 13,	113-192.	12 Nov. 1860.	" tom. li. p. 733.
14,	193-224.	10 Feb. 1862.	" tom. liv. p. 288.
15,	225-272.		
16,	273-316.		

From. livr. 1-13 the date of reception by the Academy may be taken as correct; livr. 14 we regard as Apr. 1861, livr. 15 as Oct. 1861, and livr. 16 as Nov. 1861.

[To be continued.]

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[SEVENTH SERIES.]

No. 45. SEPTEMBER 1901.

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### XXIV.—*New Species of Syntomidæ and Arctiadæ.*

By Sir G. F. HAMPSON, Bart., B.A.

THE following species of Syntomidæ and Arctiadæ form a first supplement to the first three volumes of the 'Catalogue of Lepidoptera Phalænæ of the British Museum,' and the numbers before the species indicate the position of the species in the classification adopted in those volumes.

#### Syntomidæ.

28 a. *Ceryx pleurasticta*, sp. n.

♂. Purple-black; back of head orange; pectus with lateral orange spots; tarsi with the first joint white; abdomen with dorsal orange patch on first segment and band on fifth, the intermediate segments with lateral spots. Fore wing with hyaline spot below the cell near base; a wedge-shaped patch in end of cell and another below base of vein 2; a round spot above base of vein 2 and more elongate spots above veins 3, 4, and 6. Hind wing with hyaline patch below middle of cell and round spot above vein 2.

*Hab.* KANARA, Siddapah (*Davidson*), 1 ♂ type. *Exp.* 24 millim.

30 a. *Ceryx Crawshayi*, sp. n.

Black ; patagia with orange patches ; abdomen with dorsal orange patch on first segment and subdorsal and lateral band on fourth segment. Fore wing with hyaline wedge-shaped patch nearly filling the cell ; an elongate patch below the cell from near base to near termen and elongate spots above veins 6, 4, and 3. Hind wing hyaline, the veins and margins black ; the terminal band expanding at apex and dentate inwards at vein 2.

*Hab.* BR. E. AFRICA, Kikuya, Roroma (*Crawshay*), 1 ♂, 2 ♀ type. *Exp.* 26 millim.

80 a. *Syntomis borguensis*, sp. n.

♂. Black ; head, thorax, and abdomen shot with green ; pectus with lateral orange patches ; abdomen with dorsal orange patch at base and bands on third, fourth, and fifth segments, the ventral surface with segmental lines on first four segments ; wings shot with purple. Fore wing with the costal area suffused with green ; a hyaline white spot in end of cell, an elliptical spot below base of vein 2, and elongate spots above veins 3, 4, and 6. Hind wing with hyaline white spot at base of inner area and a round spot above vein 2.

*Hab.* NIGERIA, Borgu, Yelwa Lake (*Migeod*), 2 ♂ type. *Exp.* 32 millim.

80 b. *Syntomis madurensis*, sp. n.

♂. Antennæ with long branches ; black-brown ; frons and patagia with orange patches ; hind tibia with orange streak ; tarsi with the first joint orange ; abdomen with orange bands on first and fifth segments and small spots on terminal segment. Fore wing with quadrate hyaline spots below base and in end of cell ; an oblique spot below vein 2 ; spots above veins 3 and 4 and a smaller spot above 6. Hind wing with orange medial band from cell to inner margin.

*Hab.* S. INDIA, Madura, Ammanayanahramir (*Campbell*), 4 ♂ type. *Exp.* 22 millim.

96 a. *Syntomis melaproctis*, sp. n.

♂. Black ; antennæ white at tips ; frons, a ring round neck, tegulæ, and a spot on metathorax orange-yellow ; pectus with lateral orange spots ; abdomen with basal orange patch on dorsum, followed by six bands, the anal segment wholly black. Fore wing with wedge-shaped orange-yellow

patches below base and in end of cell; a triangular patch below base of vein 2 and elongate spots above veins 3, 4, 6. Hind wing with orange basal patch in cell and on inner area widely separated from a small spot above vein 2.

*Hab.* PHILIPPINES, Samboangan (*J. J. Walker*), 2 ♂ type. *Exp.* 26 millim.

96 b. *Syntomis Clementsi*, sp. n.

Black; frons, back of head, tegulæ, patagia, and a patch on metathorax deep fulvous orange; patches on pectus and stripes on fore coxæ and fore and mid femora orange; abdomen with seven orange bands in male and six in female and the extremity orange. Fore wing with subquadrate fulvous-orange spots below base and in end of cell; a wedge-shaped spot below vein 2 usually with a small spot above 2, elongate spots above veins 7 and 6, the former sometimes absent, often a small spot above 5 and shorter spots above veins 4 and 3. Hind wing with basal fulvous-orange patch in cell and on inner area conjoined to spots above veins 2 and 3.

*Hab.* W. AUSTRALIA, Sherlock River (*Dr. E. Clements*), 2 ♂, 4 ♀ type. *Exp.* 32-38 millim.

96 c. *Syntomis attenuata*, sp. n.

♂. Black-brown; head, tegulæ, extremity of patagia, a spot on metathorax, and lateral spots on pectus orange-yellow; abdomen with seven orange bands, the anal segment with dorsal orange spot. Fore wing with wedge-shaped orange spots below base and in end of cell; an oblique wedge-shaped spot below vein 2 and small spot above 2; elongate spots above veins 3, 4, and 6 and sometimes a slight streak above 6. Hind wing with large orange basal patch conjoined to confluent spots above veins 2 and 3.

♀. Abdomen with six bands and the anal tuft orange.

*Hab.* N. AUSTRALIA, S. Heywood Island, 1 ♂ type; Bathurst Island, 6 ♂, 1 ♀; Queen's Island, 1 ♀ (*J. J. Walker*). *Exp.* 26 millim.

111 a. *Syntomis consimilis*, sp. n.

Black, shot with metallic blue-green; antennæ white at tips; neck cupreous red at sides; pectus with cupreous lateral patches; fore coxæ white in front; abdomen with cupreous dorsal patch at base, conjoined lateral spots on first five segments and usually obsolescent dorsal bands on fourth and fifth segments. Fore wing with rounded or quadrate hyaline



spot below cell near base; a patch in end of cell; an oblique patch below vein 2; elongate spots above veins 6, 4, and 3, and sometimes a small spot above vein 5. Hind wing with hyaline patch in and below cell and a patch beyond the cell between veins 2 and 5.

*Hab.* BR. E. AFRICA, Nairobi (*Betton*), 1 ♂; Kikuyu, Roromo, 1 ♂, Fort Smith (*Crawshay*), 1 ♂, 1 ♀ type. *Exp.* 24 millim.

112 a. *Syntomis cuprizonata*, sp. n.

♀. Black, shot with metallic blue; neck with cupreous-red ring; pectus with cupreous lateral patches; abdomen with cupreous dorsal patch at base, bands on fourth, fifth, and sixth segments except on ventral surface, and lateral spots and a few scales on dorsal area on second and third segments. Fore wing with antemedial quadrate hyaline patch below the cell; a patch in end of cell; an oblique patch below base of vein 2; elongate spots above veins 6, 4, and 3, and a small spot above 5. Hind wing with elongate spot in cell, a patch below the cell, and a patch beyond it above veins 2 and 3.

*Hab.* BR. E. AFRICA, Roromo, Kikuyu (*Crawshay*), 1 ♀ type. *Exp.* 24 millim.

164 a. *Syntomis chloroscia*, sp. n.

♀. Head, thorax, and abdomen black, tinged with golden green; frons, tegulæ, upper edge of patagia, patches on pectus, coxæ, and femora above pale yellow; abdomen with dorsal patch on first segment, lateral band on second and complete bands on third, fourth, and fifth segments pale yellow. Fore wing blue-black, the costa and inner margin tinged with golden green; some yellow at base of inner margin; wedge-shaped hyaline spots below base and in end of cell; an elongate spot below vein 2, dilated at basal end and extending to near termen; a streak above vein 6 and short streak above 7; elongate spots above veins 3 and 5. Hind wing with hyaline patch in and below cell, extending to near tornus and tinged with yellow at base and on inner margin; a patch beyond the cell between veins 2 and 5.

*Hab.* BR. E. AFRICA, Athi-ya-Mawe (*Betton*), 1 ♀ type. *Exp.* 30 millim.

175 a. *Syntomis congener*, sp. n.

♀. Blue-black; antennæ white at tips; tegulæ, except at middle and sides of neck, orange; pectus with lateral orange

patches; abdomen with dorsal orange patch on first segment, lateral spots on first four segments and band on fifth segment except on ventral surface. Fore wing with rounded hyaline spot below the cell near base; a quadrate spot in end of cell; an oblique spot below base of vein 2; elongate spots above veins 6, 4, and 3. Hind wing with hyaline patch below the cell and round spot between veins 2 and 3.

*Hab.* BR. E. AFRICA, Kikuyu, Ruarka River, 5500 feet (*Crawshay*), 1 ♀ type. *Exp.* 36 millim.

SECT. I.—Antennæ of male with long branches.

255 a. *Tritonactia erubescens*, sp. n.

♂. Head and thorax brown; third joint of palpi, basal joint of antennæ, streaks on femora and tibiæ, and the tarsi crimson (abdomen wanting). Fore wing with a slight crimson tinge; the costa pale rufous from middle to near apex; a round hyaline spot in end of cell; a small spot below base of vein 2, followed by a large round spot; a post-medial series of four spots between veins 7 and 3, with the two lower displaced towards termen. Hind wing pale dull crimson; a hyaline spot above base of vein 3, with a small spot above vein 4 and brownish suffusion beyond them.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 1 ♂ type. *Exp.* 36 millim.

289 a. *Metarctia flavivena*, sp. n.

♂. Head, thorax, and abdomen crimson; antennæ, tegulæ except edges, patagia, stripes on thorax, and the greater part of legs black; abdomen with slight segmental black lines, one on terminal segment more prominent, the ventral surface yellow, with black bands. Fore wing fuscous black, the veins, costa, inner margin, and cilia yellow. Hind wing yellow, with fuscous fascia on costal area; some crimson hair at base of inner margin.

♀. Abdomen with the black bands rather more prominent; hind wing with the interspaces of costal half suffused with black.

*Hab.* BR. E. AFRICA, Machakos (*Crawshay*), 1 ♂, 1 ♀ type; MASHONALAND, Salisbury (*Marshall*). *Exp.*, ♂ 42, ♀ 46 millim.

289 b. *Metarctia fusca*, sp. n.

♂. Dark smoky brown; antennæ with the shaft fulvous above towards base and at tips. Fore wing with pale

ochreous points below base of vein 2 and above veins 4 and 5. Hind wing somewhat paler.

*Hab.* BR. E. AFRICA, Kikuyu, Roromo (*Crawshay*), 1 ♂ type. *Exp.* 36 millim.

290 *a.* *Metarctia sarcosoma*, sp. n.

♂. Head, thorax, and abdomen flesh-pink; palpi, antennæ, a patch on thorax, tibiæ, and tarsi brown; abdomen with the ventral surface fulvous yellow, with fuscous bands. Fore wing fuscous brown, the inner margin and cilia ochreous. Hind wing ochreous.

*Hab.* BR. E. AFRICA, Machakos (*Crawshay*), 1 ♂ type. *Exp.* 44 millim.

292 *a.* *Metarctia fulvia*, sp. n.

♂. Uniform fulvous yellow; palpi, sides of frons, and fore coxæ and femora above tinged with fuscous. Fore wing with traces of discoidal spot; the interspaces below vein 5, and hind wing somewhat paler.

*Hab.* BR. E. AFRICA, Athi-ya-Mawe (*Betton*), 3 ♂ type. *Exp.* 36-40 millim.

292 *b.* *Metarctia pallida*, sp. n.

♂. Head and tegulæ brownish yellow; palpi and lower part of frons dark brown; thorax brown; abdomen and greater part of pectus and legs ochreous. Fore wing grey-brown, with slight yellowish-brown streaks on costal and inner areas. Hind wing pale ochreous.

*Hab.* BR. E. AFRICA, Kikuyu, Roromo, 1 ♂, Nairobi, 1 ♂ (*Crawshay*), type. *Exp.* 32-34 millim.

\*307 *a.* *Pseudospheæ rubripalpus*, sp. n.

♂. Head, thorax, and abdomen greenish black; first and second joints of palpi and fore coxæ brown-red; tarsi with the basal joint whitish; abdomen with oblique lateral white streaks on first segment, which is white below, the ventral valve edged with white. Fore wing black-brown; a short hyaline streak below base of cell; the area below the cell and vein 5 shot with brilliant purple-blue from before middle to termen. Hind wing black-brown, with short hyaline streaks below base of cell; the terminal half shot with purple-blue.

*Hab.* BRAZIL, Santos, S. Benitos (*Burchall*), type† ♂ in Mus. Oxon. *Exp.* 44 millim.

379 b. *Sarosa connotata*, sp. n.

♀. Head black, the frons and vertex with brilliant blue patches, base of frons and tips of antennæ white; thorax orange, the tegulæ black, with blue patches; outer side of patagia and mesothorax striped with black, metathorax with black patch; fore legs black, the tarsi orange below; mid legs black, the femora above and tarsi below orange; hind legs orange, the femora striped below with black; abdomen black, with dorsal and lateral series of blue spots, the base orange, second to fifth segments with subdorsal orange spots and the third and fourth with lateral spots. Wings hyaline, the veins and margins black, some orange on black patches at base: fore wing with black discoidal lunule conjoined to the black costal area; the terminal band expanding very widely on apical area and angled inwards at vein 2: hind wing with the terminal band expanding at apex and tornus.

*Hab.* PERU, R. Linimbare, St. Domingo, 4200 feet (*Simons*), 1 ♀ type. *Exp.* 56 millim.

382 a. *Sarosa lutibasis*, sp. n.

♂. Head, thorax, and abdomen deep black; frons, vertex of head, tegulæ, pectus behind, femora, and tibiæ with brilliant blue spots; hind coxa yellowish white; abdomen with yellowish-white basal patch on first segment, followed by a slender segmental line; a subdorsal series of brilliant blue spots; sublateral yellowish spots on second segment, followed by two blue spots. Wings yellowish hyaline, the veins and margins rather broadly black. Fore wing with brilliant blue spot at base; an orange streak below costa, extending to near apex; a short orange streak above vein 1, and one below it extending to middle; the terminal band expanding widely on apical area and dentate on vein 2. Hind wing with the terminal band expanding into a large patch with dentate inner edge at tornus.

*Hab.* PANAMA, La Chorrera (*Dolby-Tylor*), 1 ♂ type. *Exp.* 36 millim.

732 a. *Chrysocale corax*, sp. n.

♀. Head, thorax, and abdomen deep black, clothed with velvety pile; frons and vertex of head slightly tinged with blue; abdomen suffused with deep green on sides and ventral surface. Wings deep metallic blue-green.

*Hab.* PERU, Vilcanota (*Garlepp*), 1 ♀ type. *Exp.* 54 millim.



800 a. *Hypocladia restricta*, sp. n.

♂. Head and thorax black-brown; antennæ white at tips; vertex of head and shoulders with pairs of crimson patches; coxæ and stripes on legs white; abdomen black, with lateral crimson patch on first two segments; the ventral surface white to near extremity. Fore wing black-brown, with a purplish tinge; slight semihyaline streaks in and below middle of cell, and short streaks beyond the cell between veins 3 and 7, those between veins 3 and 5 longer. Hind wing black, with semihyaline streaks in and below cell and between bases of veins 2 to 6.

*Hab.* PANAMA, La Chorrera (*Dolby-Tylor*), 1 ♂ type. *Exp.* 30 millim.

\*882 a. *Ceramidia chalco-viridis*, sp. n.

♂. Black; palpi with white spots at base; neck with crimson spots; head, thorax, and abdomen suffused with brown-green, the last with sublateral white fasciæ except on terminal segments. Hind wing black-brown, the costal area pale.

*Hab.* BRAZIL, Minas Geraes (*Birchall*), type† in Mus. Oxon. *Exp.* 42 millim.

899 a. *Napata atricincta*, sp. n.

♂. Orange; palpi mostly black; antennæ black; legs black, streaked with white; abdomen with the terminal segment and lateral stripes widening towards extremity black, the ventral surface white. Fore wing with black streaks on costa and inner margin, the latter not reaching base; a greyish-black terminal band, widening towards costa, with minutely waved inner edge and with slight white streaks on veins 2 to 8. Hind wing with the cilia black, expanding rather irregularly onto termen towards tornus.

*Hab.* BRAZIL, Bahia, 1 ♂ type. *Exp.* 32 millim.

912 a. *Napata albimaculata*, sp. n.

♀. Black; palpi white at base; antennæ white towards tips; back of head with two white spots; some crimson behind the eyes; pectus and coxæ with white patches; abdomen with subdorsal white patches on first segment and crimson patches on fourth, fifth, sixth, and seventh segments, the ventral surface with white patches on third and fourth segments. Fore wing with white spot beyond the cell.

Hind wing with white patch below the cell, in end, and just beyond the cell.

*Hab.* PANAMA, Cana Mines (*Tylecote*), 1 ♀ type. *Exp.* 42 millim.

917 a. *Napata sanguicincta*, sp. n.

Dull black; palpi except at tips, neck, and back of head crimson; frons, tegulæ, thorax, and legs with some metallic blue; abdomen brilliant blue. Fore wing with the cilia white at apex. Hind wing shot with blue; a broad terminal crimson band, with waved inner edge, expanding below vein 3.

*Hab.* PERU, Vilcanota (*Garlepp*), 1 ♀ type. *Exp.* 32 millim.

917 b. *Napata flaviceps*, sp. n.

♀. Black, shot brilliant blue; palpi in front and frons white; vertex of head, gulæ, and spots on shoulders bright orange; patagia edged with white; pectus and the greater part of legs white; abdomen with dorsal and lateral white lines and broad ventral stripe. Fore wing with fine white streak on subcostal nervure from base to middle; a fascia from base below the cell, widening to its extremity beyond vein 2; an oblique band beyond the cell between veins 3 and 7 with rounded ends. Hind wing brilliant blue, with hyaline fascia in and beyond cell to just beyond its extremity; the inner margin white.

*Hab.* PANAMA, La Chorrera (*Dolby-Tylor*), 2 ♀ type. *Exp.* 42 millim.

1005 a. *Corcura interposita*, sp. n.

♂. Fore wing with vein 5 not anastomosing with vein 6, but with brands above and below it.

Black, shot with blue; palpi orange at base; frons bluish white; neck with orange ring; patagia and thorax streaked with white; pectus orange in front; legs striped with white; abdomen with diffused white stripe. Fore wing with whitish streak in submedian fold; an oblique white band beyond the cell between veins 7 and 2, attenuate below. Hind wing shot with brilliant metallic blue; the cilia white at tips.

*Hab.* VENEZUELA, Porto Cabello (*Hahnel*), 1 ♂ type. *Exp.* 40 millim.

1018 a. *Uraga rubricollis*, sp. n.

♀. Fore wing with vein 7 from 8 before 9.

Fuscous black; palpi scarlet at base; frons white at sides;

neck with scarlet ring; coxæ whitish; abdomen dorsally slightly suffused with blue, the ventral surface with diffused whitish fascia. Fore wing with oblique white band from subcostal nervure across end of cell to just below vein 2. Hind wing shot with metallic blue.

*Hab.* COLOMBIA, 1 ♀ type. *Exp.* 40 millim.

1033 a. *Micraga ochrea*, sp. n.

Fore wing with vein 6 from below angle of cell.

Brownish ochreous; neck orange; anal tuft yellow. Fore wing with the veins streaked with fuscous; dark points in middle of cell and on discocellulars, connected by a slight streak in discal fold; an oblique diffused line from lower angle of cell to inner margin; an obliquely curved diffused postmedial line, with dark streaks in the interspaces beyond it. Hind wing whitish, thinly scaled, the terminal area suffused with fuscous brown.

*Hab.* BRAZIL, Rio Grande do Sul, 1 ♂, 1 ♀ type. *Exp.* 30 millim.

\*1061 a. *Delphyre aclytioides*, sp. n.

♀. Black-brown; palpi yellow at base; frons with yellow band above it; fore coxæ yellow at sides; abdomen with metallic-blue bands on terminal segments, the ventral surface with yellow bands. Fore wing with the veins pale-streaked; a postmedial orange spot on costa, with an oblique yellowish band from it to termen above tornus.

*Hab.* CAYENNE, type† ♀ in Mus. Oxon. *Exp.* 36 millim.

\*1061 b. *Delphyre varians*, sp. n.

♀. Black-brown; abdomen with the terminal segments silvery blue and lateral and sublateral series of spots. Fore wing with oblique postmedial orange band from just below costa to vein 3, attenuate below. Hind wing semihyaline at base.

*Ab.* 1.—Fore wing with the band reduced to a small spot at upper angle of cell.

*Hab.* AMAZONS, type† ♀ in Mus. Oxon. *Exp.* 40 millim.

\*1064 a. *Delphyre flaviventralis*, sp. n.

♀. Fuscous brown; palpi with the first joint orange; back of head with two orange spots; abdomen with orange ventral stripe not reaching extremity. Fore wing with oblique whitish band across end of cell from subcostal nervure to

submedian fold; an oblique postmedial band from vein 7 to 3. Hind wing black, with hyaline in, below, and beyond cell.

*Hab.* VENEZUELA, type† ♀ in Mus. Oxon. *Exp.* 34 millim.

1149 a. *Scepsis discopuncta*, sp. n.

♀. Pale ochreous, irrorated with black-brown; vertex of head with black streak; neck with orange ring; outer edge of patagia and vertex of thorax with blackish streaks; abdomen dorsally blackish, except at extremity. Fore wing with black streak in base of cell; an oblique antemedial striga above vein 1, continued as a slight streak above submedian fold; a point in middle of cell, with slight streak from it to discocellulars above discal fold; points in angles of cell, a point beyond upper angle, and three beyond lower angle; obscure postmedial and subterminal series of points conjoined into streaks towards apex. Hind wing semihyaline, the terminal area tinged with brown from apex to vein 1.

*Hab.* BOLIVIA, Chaco (*Garlepp*), 1 ♀ type. *Exp.* 48 millim.

1149 b. *Scepsis subhyalina*, sp. n.

♂. Pale ochreous; head white; frons and vertex with black spots; palpi and antennæ ochreous and fuscous; metathorax with black spot; abdomen with lateral series of black points. Wings semihyaline: fore wing with very obscure diffused fuscous medial and subterminal lines; hind wing nearly white.

*Hab.* BOLIVIA, Tanampaya (*Garlepp*), 1 ♂ type. *Exp.* 40 millim.

1153 a. *Lycomorpha Drūwei*, sp. n.

♀. Deep black. Fore wing with crimson patch from base to well beyond middle, extending from just below costa down to vein 1. Hind wing with crimson fascia on basal half of costa.

*Hab.* MEXICO, Durango (*Becker*), 1 ♀ type. *Exp.* 28 millim.

1157 a. *Otenucha albipars*, sp. n.

♂. Dull black; frons, vertex of head, and metathorax with patches of brilliant blue; abdomen dorsally shot with blue, a white patch at base of ventral surface. Fore wing with medial orange-yellow band, sometimes not quite reaching costa or inner margin. Hind wing white, the terminal third



black, expanding somewhat towards costa. Underside of hind wing with bluish-fuscous patch on costa near base, followed by a yellow patch.

The two specimens examined have some grey on terminal band of hind wing, expanding into a large patch before tornus on upperside, at tornus on underside, and narrowing to a point at vein 4; this, however, does not absolutely agree in the two specimens or on both sides of the same specimen, and may be a stain.

*Hab.* BOLIVIA, San Jacinto, Locotal (*Garlepp*), 1 ♂ type. *Exp.* 32 millim.

1179 a. *Philoros obscurata*, sp. n.

♀. Pale ochreous, irrorated with brown; abdomen dorsally brown. Fore wing with black point in lower angle of cell; an obscure diffused brown band, very acutely angled beyond lower angle of cell and oblique towards costa and inner margin; an oblique inwardly diffused brown patch from costa before apex. Hind wing semihyaline towards base.

*Hab.* COLOMBIA, 1 ♀ type. *Exp.* 40 millim.

1179 b. *Philoros perirrorata*, sp. n.

♀. Ochreous, thickly irrorated with black; abdomen dorsally suffused with black except at extremity. Fore wing very thickly and evenly speckled with brown. Hind wing semihyaline except towards termen; the terminal area ochreous, irrorated and clouded with fuscous.

*Hab.* BOLIVIA, Chaco (*Garlepp*), 1 ♀ type. *Exp.* 46 millim.

Arctiadae.

NOLINÆ.

21 a. *Celama flaviciliata*, sp. n.

♂. Head and thorax grey, mixed with brown; the genital tufts ochreous. Fore wing whitish, irrorated with brown and tinged with brown, especially towards termen; traces of an antemedial line oblique from median nervure to inner margin; a tuft of blackish scales in middle of cell; the postmedial line represented by black points on veins 7 to 3, then bent inwards to below end of cell, and diffused; traces of an irregular subterminal line; some brown marks on termen; cilia dark at base. Hind wing brown, the cilia yellow.

*Hab.* S. LEONE (*W. G. Clements*), 2 ♂ type. *Exp.* 14 millim.

17 a. *Celama enphæa*, sp. n.

♂. Head, thorax, and abdomen grey, irrorated with brown. Fore wing grey-brown, thickly irrorated with brown and black; faint traces of an oblique antemedial line from costa to submedian fold; the tufts of scales at middle and end of cell fuscous; the postmedial line black, minutely dentate, incurved below vein 3; a fine dark terminal line. Hind wing grey-brown, with fine dark terminal line.

*Hab.* W. CHINA, Moupin (*Kricheldorf*), 1 ♂ type. *Exp.* 20 millim.

39 a. *Celama socotrensis*, sp. n.

Brownish white, irrorated with brown; palpi blackish at sides; tarsi banded with black. Fore wing with distinct blackish antemedial line, angled inwards to costa and with a dark mark before it in submedian interspaces; the tufts small and dark, the tuft in cell confluent with the antemedial line; the postmedial line acutely angled outwards below costa, less acutely at veins 4 and 1, and angled inwards at discal and submedian folds, a less distinct line parallel to its inner side; the subterminal line angled outwards at vein 6 and excurved at middle. Hind wing whitish, tinged with fuscous brown.

*Hab.* SOKOTRA, Jena-agahan, 1 ♂ type; Adho Dimellus, 3 ♀; Hadibu plain, 1 ♀ (*Grant*). *Exp.* 14–16 millim.

Distinct from *C. pumilla*.

43 a. *Celama cretacea*, sp. n.

♀. White, tinged with reddish brown; palpi rufous at sides; tarsi banded with rufous. Fore wing with the costal edge towards base and some spots on costa rufous; the tufts of scales rufous; a fine dark antemedial line, angled outwards to the tuft in middle of cell, then sinuous; the postmedial line punctiform, bent outwards below costa, acutely angled outwards at vein 4, then strongly incurved; an indistinct irregular subterminal line, angled outwards at vein 6 and excurved at middle. Hind wing white, slightly tinged with brown towards termen.

*Hab.* BOMBAY, 4 ♀ type. *Exp.* 14 millim.

46 a. *Celama melaleuca*, sp. n.

♀. Silvery white; palpi black at base; legs streaked with black. Fore wing with prominent black antemedial line, slightly waved and angled outwards on subcostal and median nervures; an elliptical black medial patch on costa, with a

dentate blackish line from near its lower extremity, excurved to vein 4, then oblique, dentate and partly confluent with the postmedial line, which is prominent, black, minutely dentate, excurved from costa to vein 4, then incurved; an irregularly dentate subterminal line, bent inwards to costa, on which there is a black spot beyond it; a terminal series of rather diffused black spots. Hind wing fuscous, with indistinct discoidal spot.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 1 ♀ type. *Exp.* 26 millim.

65 a. *Nola transecta*, sp. n.

White, with a yellowish tinge; palpi black; head and tegulæ strongly irrorated with black. Fore wing with the costal and apical areas strongly suffused with red-brown and irrorated with black, the black irroration running obliquely across lower edge of apical area to middle of termen; traces of an antemedial line angled below cell; the postmedial line represented by black points on veins 6, 7; traces of a sinuous grey subterminal line on the dark area; cilia red-brown. Hind wing fuscous brown, much darker in one female; a discoidal point, distinct on underside.

*Hab.* S. LEONE (*W. G. Clements*), 2 ♂, 2 ♀ type. *Exp.* 18 millim.

99 a. *Pæcilonola chionobasis*, sp. n.

♂. Palpi and frons black; vertex of head and thorax pure white, the antennæ towards tips and a patch on metathorax fuscous; pectus, legs, and abdomen tinged with fuscous, tarsi ringed with white. Fore wing pure white; a large triangular black patch on middle of costa, with a few silvery scales on it, its apex extending to median nervure, its outer edge strongly indented; the terminal area fuscous black, its inner edge waved and angled inwards to cell at vein 3; an irregular subterminal series of black marks. Hind wing with the basal half white, the terminal half fuscous.

*Hab.* KANGRA VALLEY, 4500 feet (*Dudgeon*), 1 ♂ type. *Exp.* 14 millim.

100 a. *Pæcilonola ochritincta*, sp. n.

♂. Head, thorax, and abdomen white; palpi, antennæ, and legs fuscous. Fore wing with the basal area white, tinged with ochreous, its outer edge oblique from costa before middle to tornus; short dark streaks on and below vein 1 just beyond middle; the apical half greyish fuscous, with a

diffused whitish patch extending from apex to discocellulars ; some minute white specks on apical half of costa ; an obscure irregularly trisinate subterminal whitish line, with some rufous on its inner side and a tuft of black scales below vein 3. Hind wing white, tinged with fuscous.

*Hab.* CEYLON, Haputale (*Mackwood*), 1 ♂ type. *Exp.* 16 millim.

LITHOSIANÆ.

166 a. *Pelosia albicostata*, sp. n.

♂. Grey-brown or fuscous brown ; vertex of head, legs, extremity and ventral surface of abdomen ochreous white. Fore wing with narrow ochreous-white costal fascia ; cilia of both wings ochreous white.

*Hab.* JAPAN (*Pryer*), 2 ♂ type. *Exp.* 20–26 millim.

231 a. *Phryganopsis flavicosta*, sp. n.

♀. Head, thorax, and abdomen orange ; fore tibiæ at extremity and tarsi above tinged with fuscous ; metathorax whitish. Fore wing dull yellowish white, with narrow yellow costal fascia ; the termen and cilia tinged with orange. Hind wing pale yellow.

*Hab.* S. LEONE (*Austen*), 1 ♀ type. *Exp.* 30 millim.

232 a. *Phryganopsis straminea*, sp. n.

♀. Straw-yellow ; abdomen brownish grey, with the anal tuft ochreous. Fore wing slightly irrorated with brown. Hind wing pale yellow.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 1 ♀ type. *Exp.* 24 millim.

232 b. *Phryganopsis ochreata*, sp. n.

♀. Head and thorax ochreous ; abdomen grey, the extremity orange. Fore wing brownish ochreous, the costa and termen tinged with orange. Hind wing grey-brown.

*Hab.* NYASALAND, Chiromo (*De Jersey*), 1 ♀ type. *Exp.* 20 millim.

251 a. *Macrosia chalybeata*, sp. n.

♀. Head and tegulæ at base orange ; thorax blue-grey, with orange patch on metathorax ; pectus and legs orange, the mid and hind femora above fuscous ; abdomen orange,



dorsally greyish towards base. Fore wing steely blue-grey, the costa and cilia orange. Hind wing orange.

*Ab.* 1.—Fore wing with the termen yellow. Salisbury.

*Hab.* BR. E. AFRICA, Eb Urru (*Betton*), 3 ♀ type; MASHONALAND, Salisbury (*Marshall*), 1 ♀. *Exp.* 42 millim.

251 *b.* *Macrosia polioplaga*, sp. n.

♂. Fore wing with vein 6 from below angle of cell, 7, 8, 9 stalked; 10, 11 from cell.

Head, thorax, and abdomen red-brown. Fore wing bright red-brown; a grey triangular patch from cell before middle to discocellulars, where it extends from upper angle of cell to vein 1, a fuscous point on its lower edge near its base just below median nervure, and a discoidal lunule. Hind wing very ample, yellowish brown, the disk rather redder brown, and with some long hairs on upperside in the cell.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 1 ♂ type. *Exp.* 44 millim.

252 *a.* *Otenosia albiceps*, sp. n.

♀. Fore wing with vein 10 from before 7.

Deep red-brown; upper part of frons and vertex of head pure white; fore legs with the extremity of tibia and rings on first two tarsal joints white; mid tibiæ and first two tarsal joints white; anal tuft whitish. Fore wing with erect white antemedial line; a postmedial white line, slightly angled at vein 6 and oblique towards costa. Hind wing bright rufous.

*Hab.* BATIAN, Mt. Sibela, 3000 feet (*Doherty*), 1 ♀ type. *Exp.* 20 millim.

289 *a.* *Ilema punctilineata*, sp. n.

Head and thorax pale red-brown; abdomen pale ochreous, the extremity and ventral surface tinged with rufous. Fore wing red-brown; the basal and terminal areas with darker irroration; an indistinct dark medial line, slightly angled at discocellulars, then oblique, and with black points on it in end of cell and submedian fold. Hind wing pale ochreous yellow.

*Ab.* 1.—Fore wing with the black points obsolete.

Fore wing with vein 6 shortly stalked with 7, 8, 9, or from cell; 11 anastomosing with 12.

*Hab.* BR. E. AFRICA, Masailand, E. Quaso (*Betton*), 3 ♀; Uganda Ry., mile 478 (*Betton*), 2 ♂, 3 ♀ type. *Exp.* 38–40 millim.

291 a. *Ilema peperita*, sp. n.

♀. Head and thorax grey, tinged with brown and irrorated with black; abdomen brownish grey. Fore wing brownish grey, strongly irrorated with black; a very indistinct post-medial line, excurved from below costa to vein 6, then very oblique, and with a black point on it in submedian fold and obscure spot on inner margin. Hind wing brownish white slightly irrorated with fuscous.

Fore wing with vein 6 from below angle of cell; 7, 8, 9 stalked; 11 anastomosing with 12.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 1 ♀ type; Nakuro, 1 ♀. *Exp.* 34 millim.

304 a. *Ilema distigmata*, sp. n.

♀. Ochreous yellow; fore legs with the extremity of femora and the tibiæ above fuscous. Fore wing with black spot in end of cell, and another rather nearer base in submedian fold. Hind wing paler.

The W.-African specimen is shorter-winged than the one from E. Africa.

Fore wing with vein 6 shortly stalked with 7, 8, 9; 11 anastomosing with 12.

*Hab.* OLD CALABAR (*Sampson*), 1 ♀ type; BR. E. AFRICA, Kikuyu, Nairobi Plains (*Betton*), 1 ♀. *Exp.* 32-38 millim.

310 a. *Ilema creatoplaga*, sp. n.

♂. Head and thorax red-brown; palpi, frons, and tibiæ tinged with fuscous; abdomen grey, the hair on sides and the anal tufts fulvous. Fore wing red-brown, tinged with fuscous except on inner area and a postmedial patch on costal area; a pale yellow-brown oblong patch occupying the terminal half of cell and extending to submedian fold. Hind wing pale brownish ochreous.

Fore wing with vein 6 from below angle of cell; 7, 8, 9 stalked; 11 slightly anastomosing with 12.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 1 ♂ type. *Exp.* 38 millim.

322 a. *Ilema sanguicosta*, sp. n.

♂. Head and tegulæ scarlet; palpi with the third joint fuscous; antennæ ochreous, black at extremity; thorax brown, with scarlet patch on metathorax; legs scarlet, with brown stripes above and the tarsi brown; abdomen brown, with the last two segments and ventral surface orange. Fore

wing fuscous brown; the costal edge scarlet, with a yellowish fascia below it, expanding on apical area; cilia yellow. Hind wing pale yellow, the costal half fuscous brown, leaving the termen yellow.

♀. Abdomen pale brownish instead of fuscous brown. Hind wing wholly yellow. Fore wing with vein 6 from angle of cell; 9 from 10 anastomosing with 8 to form the areole; 11 anastomosing with 12.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 2 ♂ type; MASHONALAND, Salisbury (*Marshall*), 1 ♀. *Exp.*, ♂ 46, ♀ 36 millim.

340 a. *Ilema phæocraspis*, sp. n.

♀. Head and thorax pure white; palpi, frons, and antennæ brown, tinged with fuscous; pectus and legs pale brown, the latter tinged with fuscous above; abdomen pale reddish brown. Fore wing pure white; the costal edge pale reddish brown, black towards base. Hind wing brownish yellow. Underside tinged with brown, some yellow-brown on costal area of both wings.

Fore wing with vein 6 from below angle of cell; 7, 8, 9 stalked; 11 anastomosing with 12.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 4 ♀ type; Masailand, Quaso, 1 ♀. *Exp.* 34-38 millim.

346 a. *Ilema leia*, sp. n.

♂. Pale grey-brown; abdomen yellowish at extremity. Hind wing whitish, the costal area pale grey-brown.

Fore wing with vein 6 from below angle of cell; 7, 8, 9 stalked; 11 anastomosing with 12.

*Hab.* BR. E. AFRICA, Uganda Ry., mile 478 (*Betton*), 1 ♂ type. *Exp.* 24 millim.

441 a. *Agylla holochrea*, sp. n.

Pale ochreous yellow; palpi at tips, antennæ, stripes on femora, the tibiæ and tarsi fuscous. Underside of fore wing suffused with fuscous except marginal areas.

*Hab.* W. CHINA, Chang Yang (*Pratt*), 1 ♂, 2 ♀ type. *Exp.*, ♂ 42, ♀ 48 millim.

441 b. *Agylla complanodes*, sp. n.

♀. Head and tegulæ orange-yellow; thorax grey; pectus, legs, and abdomen orange-yellow. Fore wing grey, with

narrow orange-yellow fasciæ on costa and inner margin. Hind wing orange-yellow.

*Hab.* BR. C. AFRICA, L. Nyasa (*De Jersey*), 1 ♀ type. *Exp.* 32 millim.

542 a. *Stictane junctilinea*, sp. n.

♀. White; head, thorax, and abdomen tinged with grey-brown. Fore wing irrorated with grey-brown; a slight dark streak on base of costa; a subbasal black point in cell; the medial line excurved, connected from vein 2 to inner margin by a dark shade with the postmedial line, which is oblique from costa to submedian fold, then outwardly oblique; subterminal points on veins 6, 4, 3, 2, 1, the two latter conjoined. Hind wing tinged with brown.

*Hab.* SINGAPORE (*Ridley*), 1 ♀ type. *Exp.* 18 millim.

Genus MICROTANE, nov.

. Type *M. fusca*.

Proboscis absent; palpi porrect, slender, not reaching beyond the frons; antennæ of male ciliated; tibiæ with the spurs long. Fore wing with the apex rounded; vein 3 from before angle of cell; 4, 5 stalked; 6 from upper angle; 7, 8, 9 stalked, 7 from beyond 9; 10, 11 from cell. Hind wing with vein 2 from towards angle of cell; 3, 4 stalked; 5 absent; 6, 7 stalked; 8 from middle of cell.

541 a. *Microtane fusca*, sp. n.

♂. Fuscous brown; abdomen blackish, the anal tuft ochreous. Fore wing irrorated with black; the costal area blackish towards base; small black spots in middle and end of cell and beyond its extremity; a blackish patch on costa just beyond middle and another before apex; a terminal series of black points. Hind wing fuscous, with indistinct discoidal spot.

*Hab.* CEYLON, Matelé (*Pole*), 1 ♂ type. *Exp.* 12 millim.

Genus CYCLOSODES, nov.

Proboscis fully developed; palpi slender, oblique, extending to just beyond frons; antennæ of female ciliated; tibiæ with the spurs long; anal tuft of female large. Fore wing short, broad, the costa strongly arched, the apex rounded; vein 2 curved at origin; 3 from before angle; 4, 5 strongly stalked; 6, 7 strongly stalked; 8, 9 absent; 10, 11



from cell, free. Hind wing with vein 2 from towards angle of cell; 3, 4 coincident; 5 from well above angle; 6, 7 strongly stalked; 8 from middle of cell.

551 a. *Cyclosodes flavicostata*, sp. n.

♀. Head fuscous brown; tegulæ and patagia ochreous; thorax brown; abdomen fuscous, the anal tuft pale. Fore wing silky red-brown, the costa and cilia ochreous yellow. Hind wing fuscous brown.

*Hab.* BORNEO, Kuching (*Shelford*), 1 ♀ type. *Exp.* 20 millim.

708 a. *Meteugoa melanoleuca*, sp. n.

♂. Palpi not reaching vertex of head; black; head, tegulæ, patagia, fore and mid legs irrorated with white scales. Fore wing with white antemedial band very broad at inner margin, narrowing to costa; a white subapical spot. Hind wing with white band extending from near base to beyond middle and not reaching inner margin.

*Hab.* N. GUINEA, Milne Bay (*Meek*), 1 ♂ type. *Exp.* 22 millim.

744 a. *Odozana leucota*, sp. n.

♀. White; head, thorax, and abdomen slightly tinged with fulvous. Fore wing with scale-tooth at tornus; the greater part of wing tinged with fulvous; an indistinct dark antemedial line, bent inwards to costa and angled outwards on the veins; a black point at lower angle of cell; the post-medial line strongly bent outwards beyond the cell and angled on veins 6 and 4, with diffused conjoined fulvous spots beyond it between vein 6 and inner margin; the termen and cilia with fuscous spots. Hind wing fuscous, the cilia white except towards tornus.

*Hab.* PANAMA, Cana Mines (*Tylecote*), 1 ♀ type. *Exp.* 18 millim.

898 a. *Gymnasura taprobana*, sp. n.

Fore wing with vein 11 free; male with a small post-medial tuft of scales below costa.

♂. Ochreous; abdomen whitish above except anal tuft. Fore wing with a fuscous subbasal spot on costa; an ill-defined antemedial line, excurved below costa and not reaching inner margin; an oblique medial line, diffused inwards to the antemedial line at middle, and slightly angled inwards in submedian fold; two points on discocellulars;

postmedial, subterminal, and terminal series of points. Hind wing thinly scaled, the subcostal area tinged with fuscous; faint traces of a diffused medial line; a discoidal spot; the termen tinged with fuscous.

*Hab.* CEYLON, Matelé (*Pole*), 1 ♂ type. *Exp.* 18 millim.

1167 *a.* *Eugoa bilineata*, sp. n.

♂. Ochreous; head, thorax, and abdomen irrorated with brown; palpi and antennæ tinged with brown. Fore wing slightly irrorated with brown; a strongly curved antemedial line, expanding into a spot on costa; an elongate black point in end of cell; the postmedial line excurved beyond the cell and expanding into a spot on costa; subterminal streaks below veins 10, 8, and 4, and an oblique streak from postmedial line at vein 3 to tornus. Hind wing yellower.

*Hab.* SINGAPORE (*Ridley*), 1 ♂ type. *Exp.* 16 millim.

ARCTIANÆ.

1852 *a.* *Hyphantria strigulosa*, sp. n.

♂. Head and thorax white, tinged with yellow; palpi black, the basal joint orange; antennæ black, with some white scales on shaft above; tegulæ edged with orange; patagia with slight black streaks; femora orange above; fore tibiæ streaked with black, the tarsi banded with black; abdomen orange, with dorsal and lateral black points on terminal segments, the anal tuft and ventral surface ochreous white. Fore wing ochreous white, the costal edge orange; a black streak in base of cell; subbasal streaks below costa and above and below vein 1; an antemedial streak below the cell and a spot above vein 1; two slight medial streaks in cell; points in and beyond upper angle of cell; a postmedial series of diffused irregular spots, interrupted in places and incurved below vein 3; a subterminal series of short streaks on each side of veins 7 to 3 bent outwards to apex, points further from base above and below vein 2, and a point above vein 1 near tornus; a terminal series of points in the interspaces. Hind wing ochreous white; a black discoidal spot and slight streak on apical part of termen.

*Hab.* NATAL, 1 ♂ type. *Exp.* 40 millim.

1860 *a.* *Estigmene gynephæa*, sp. n.

♂. Head orange; palpi and antennæ blackish; thorax pale yellow; pectus and legs grey, the latter with the femora

orange above; abdomen orange, with dorsal and lateral series of black spots except on first segment, the ventral surface grey-white. Fore wing yellow, the veins finely streaked with black except on costal area. Hind wing pale yellow.

♀. Head and thorax deep orange; pectus, legs, and ventral surface of abdomen fuscous. Fore wing orange-brown, the costal area to beyond middle, the inner margin finely, and the cilia orange; a black point at lower angle of cell. Hind wing fuscous black; a diffused orange streak on median nervure; the inner margin and cilia orange; an orange discoidal point: the underside orange, with large fuscous patch on terminal area from costa to vein 2.

*Hab.* MASHONALAND, Salisbury (*Marshall*), 2 ♂, 1 ♀ type. *Exp.*, ♂ 36, ♀ 38 millim.

XXV.—*On the Presence of a Superbranchial Organ in the Cyprinoid Fish Hypophthalmichthys.* By G. A. BOULENGER, F.R.S.

SINCE the discovery by Ehrenberg and by Rüppell of the singular accessory branchial organ known as the "gill-snail"\*, whence the Nile fish *Heterotis* derives its name, more or less similar structures have been described in various other Malacopterygians and in some Ostariophysi of the family Characinidæ†. No examples of anything of the sort have yet been furnished by the Cyprinidæ, so closely related to the Characinidæ; but this is no doubt due to the little attention that has been paid to the anatomy of the exotic genera of this large family. I am now able to fill up this gap in our knowledge by pointing out the presence of a superbranchial organ in the curious Chinese genus *Hypophthalmichthys*, Bleeker‡, which is thus added to the list of fishes provided with this problematic structure.

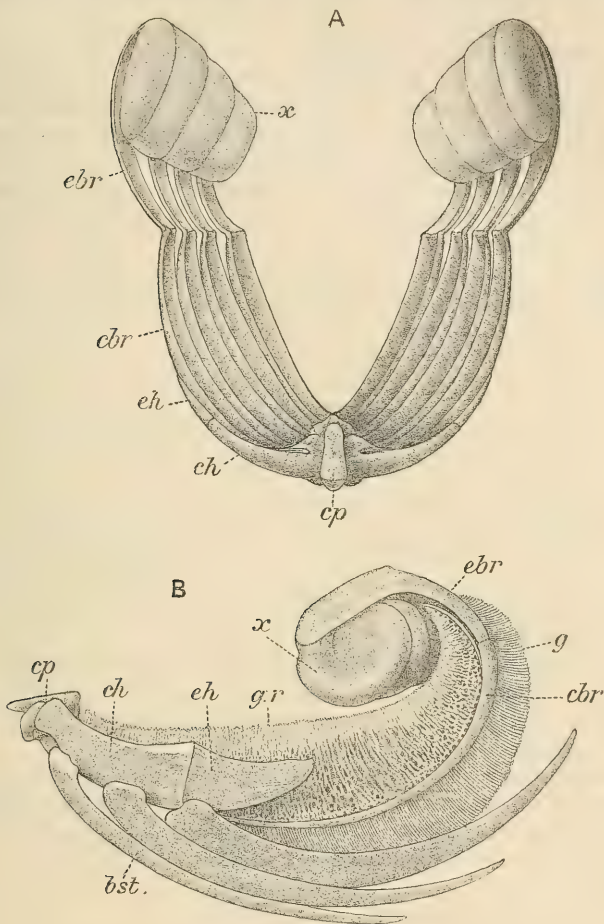
Although several descriptions of *Hypophthalmichthys* have been given, I do not find any allusion to the organ in question, which can only be seen by a removal of the membrane of the branchial chamber; otherwise it only appears as a thick protuberance on each side of the pharynx, filling up the space left by the gill-arches, with folds fitting between every two

\* Hyrtl, Denkschr. Ak. Wien, viii. 1854, p. 85; Hemprich & Ehrenberg, Symb. Phys., Zoot. pl. ix.

† Hyrtl, Denkschr. Ak. Wien, xxi. 1863, p. 7; Sagemehl, Morphol. Jahrb. xii. 1887, p. 307.

‡ For a synopsis of the eight species known, cf. Herzenstein & Warpachowski, Trud. St. Petersburg. Nat. xviii. 1887, p. 40.

series of gill-rakers. Dr. Günther \* has described the gill-rakers as very long, slender, lanceolate; but this is only true of the species *H. nobilis*, Richards.,—*H. molitrix*, C. & V.,



*Hypophthalmichthys molitrix*.

A. Dorsal view of gill-arches, the epibranchials pushed back to show the superbranchial organ. B. Side view, the epibranchial slightly raised.

bst. Branchiostegal. cbr. Ceratobranchial. ch. Ceratohyal. cp. Copula. ebr. Epibranchial. eh. Epihyal. g. Gill-filaments. g.r. Gill-rakers. x. Superbranchial organ.

\* Cat. Fish. vii. p. 298.



the type of the genus, having them, as first pointed out by Bleeker \*, fused into thin plates of spongy appearance, which he describes as "ex parte reticulatim unitis," and which must act as a most efficient sifting apparatus.

Above the gills, apparently coiled like a whelk, is the bulky organ to which attention is drawn. It is not without a certain resemblance at first sight to the gill-snail of *Heterotis*; but on closer inspection it is found not to be spirally coiled at all, but to consist of four distinct parts each attached to the ventral surface of the upper segment of a gill-arch and forming a simple involution. It thus differs very considerably from the organ described in other fishes, and which depends of the fourth branchial arch only.

I do not know of any observations on the habits of *Hypophthalmichthys* which would throw light on the function of the organ to which attention is here drawn.

# XXVI.—On a new Form of *Puma* from Patagonia.

By OLDFIELD THOMAS, F.R.S.

THE National Collection owes to the generosity of Mr. C. Arthur Pearson the skin of a fine puma, obtained by Mr. Hesketh Prichard during the recent 'Daily Express' expedition to Patagonia. The skin is remarkably unlike any known form of puma, and appears certainly to represent a new subspecies.

Dr. Matschie has already shown † that the red puma of the tropics, to which he restricts the name *Felis concolor*, is replaced south of 25° S. lat. by the silver-grey form for which Molina's name *F. puma* is used.

Now, again, south of about 44° S. lat., there proves to be another form, represented in the British Museum not only by Mr. Prichard's skin from Santa Cruz, but by a second much younger specimen from the Rio Senguer. Both show the same characteristics, and are equally different from the Argentine silver-grey form.

In commemoration of Mr. Pearson's scientific spirit in sending out the expedition, and in presenting the specimen to the National Museum, I would propose to call it

*Felis concolor Pearsoni*, subsp. n.

General build thick and sturdy, with comparatively short

\* Verh. Akad. Amsterd. xii. no. 2, 1871, p. 83.

† SB. Ges. nat. Fr. Berlin, 1892, p. 220; 1894, p. 58.

limbs and tail. Fur thick and woolly, the specimens evidently in winter pelage. General colour nearest to Ridgway's "clay-colour," therefore exceedingly different from the nearly "drab-grey" of *F. c. puma*. This colour is most vivid along the back, paler laterally on the sides, but there is nothing that can be called a distinct dorsal dark line. Under surface whitish fawn, the hairs sandy at their bases, whiter terminally. Face very much like back, darker markings practically obsolete; the usual lighter markings near the eye present but not conspicuous. Ears of normal length, their backs uniformly whitish fawn, without darker markings. Outer sides of limbs like back, inner sides like belly; ends of fingers and toes whitish, without any darker markings round the pads. Tail proportionally very short, brownish clay-colour above, whitish below, the tip not or scarcely darker.

Dimensions of the typical skin, which has been tanned and stretched, so that the measurements are merely approximate:—Head and body 1370 millim., tail 530, ear 80.

*Hab.* Santa Cruz, Patagonia; about 70 miles inland.

*Type.* Female. B.M. no. 1. 8. 12. 1. Brought home by Mr. H. Prichard and presented by Mr. C. Arthur Pearson.

The skin was bought by Mr. Prichard from Indians in the region mentioned, so that neither flesh-measurements nor skull were obtained.

The second skin is that of a young male, killed on the Senguier River, in March 1897, by one of the collectors from the La Plata Museum, by whom it was presented to the British Museum. Owing to its youth, its peculiarities had not been previously noticed.

*F. c. Pearsoni* is distinguished from *F. c. puma* not only by its very different general colour, but also by its shorter tail, light-coloured ear-backs, and the absence of the dark markings round the digital pads.

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## XXVII.—On a Collection of Bats from Para.

By OLDFIELD THOMAS, F.R.S.

I OWE to the kindness of Dr. E. A. Goeldi, Director of the Goeldi Museum, Para, the opportunity of working out a large number of bats obtained at that interesting locality, and have thought it worth while to give a list of them. The collection is especially rich in members of the genus *Artibeus*, of which no less than five are represented in it.

A complete set of the collection has been presented to the British Museum.

*Lasiurus borealis*, Müll.

One.

*Myotis nigricans*, Wied.

One.

*Rhynchonycteris naso*, Wied.

One.

*Saccopteryx bilineata*, Temm.

Four.

*Noctilio albiventer*, Spix.

Four.

*Molossus rufus*, Geoff.

Nineteen.

*Molossus obscurus*, Geoff.

Thirty.

*Molossus planirostris paranus*, subsp. n.

Closely similar to the typical form in all essential respects—in size, shape of ears, general characters of skull, &c. Colour much darker throughout, the tips of the hairs black instead of brown, and the chin and centre line of the chest and belly scarcely lighter than the rest instead of markedly contrasted white. Patch of fur near the elbow on the antebrachial membrane and basal third of the forearm particularly well developed, as is also that on the wing-membrane on the distal side of the forearm.

Skull rather longer and narrower than in true *planirostris*, especially narrower across the angular anteorbital ridges, which also appear to be further forwards. The distance across these ridges is decidedly less in *paranus* and more in *planirostris* than half the basal length.

Dimensions of the type:—

Forearm 35 millim.

Head and body 58; tail 28; lower leg 12; third finger, metacarpal 37, first phalanx 16, second phalanx 14; length of fifth finger 31.

Skull: greatest length 17·3; basal length 15; zygomatic breadth 11·8; anteorbital breadth 7·2; interorbital breadth 4·5; front of canine to back of last molar 6·6.

Type. Male. B.M. no. 1. 7. 11. 15.

This form may be readily distinguished from the typical Guianan *planirostris* by the darker colour of its chest and belly, and the different form of the anterior part of the skull.

*Micronycteris minuta*, Gerv.

Five.

This striking species may be readily recognized, firstly, by its minute middle lower premolar, shown in Gervais's figure but not mentioned by him, Dobson, or Miller; and, secondly, by the very peculiar structure of the connecting band between the ears. This in some species is almost obsolete, in *M. megalotis* is low and has a shallow notch at its centre, while in *M. minuta* it is very high and so deeply notched in the centre that it is practically divided into two prominent triangular lappets, one attached to each ear. This character does not seem to have been noticed by anyone, though it occurs in all the specimens determined as *Schizostoma minutum* by Dobson.

The forearm of the type was said by Gervais to be only 32 millim., but on remeasurement by Dobson was put down as 1.35 in. (= 34.5 millim.). The present series are rather larger (36 millim.), but so are others from close to the typical locality.

*Phyllostoma hastatum*, Linn.

Twenty-one.

*Phyllostoma elongatum*, Geoff.

Two.

*Hemiderma perspicillatum*, Linn.

Thirty-eight.

For nomenclature see below.

*Glossophaga soricina*, Pall.

Ten.

*Artibeus planirostris*, Spix.

One.

*Artibeus concolor*, Pet.

Two.

From the meagre description given by Peters, there seems to be no reason to distinguish the Para specimens from his Guianan species.

*Artibeus bilobatus*, Pet.

Two.



*Artibeus jamaicensis*, Leach.

One.

This appears to me to be the name which should be borne by the common bat called by Dobson *A. perspicillatus*, Linn.

Linnæus's name\* was founded primarily in the tenth, and solely in the seventh (quoted in the tenth) edition of the 'Systema,' on Seba's *Vespertilio americanus vulgaris*, plate lv. fig. 2 of the 'Thesaurus.' Now that animal is clearly not an *Artibeus*, and in my paper† on Seba's mammals I have identified it with a bat referable to what is usually known as *Hemiderma brevicauda*, and this latter therefore I believe ought to be called *Hemiderma perspicillatum*, Linn.

The next name for the *Artibeus* is *jamaicensis*, Leach, 1822, and that may provisionally be used for it. Should southern specimens require to be separated from the northern, their name would be *Artibeus lituratus*; *Phyllostomus lituratum*, Licht.‡, founded on Azara's Chauve-souris Premier, dating from 1823. Wied's "*superciliatum*" would also be available for the Brazilian animal if the Jamaican form proved distinct, as, indeed, Dr. Allen considers it to be.

*Artibeus cinereus*, Gerv.

One.

*Vampyrops zarhinus*, H. All.

One.

This bat may be readily distinguished from all species of *Vampyrops* hitherto known by the extremely small size of the incisors, which do not touch one another. This character is also shared with the species described in the footnote §.

\* Syst. Nat. (10) i. p. 31 (1758). In cases such as this, *Didelphis marsupialis*, and others, where Linnæus in his tenth edition quotes earlier works of his own, I think it would be advisable that such earlier works should be the guiding basis for selection among his references. It seems contrary to common sense that elimination or any other method should be permitted to bring a Linnean name on to an animal not mentioned at all in the first giving of the name by Linnæus himself, even though such first naming may, as "pre-Linnean," be technically invalid.

† P. Z. S. 1892, p. 315.

‡ Verz. Doubl. p. 3 (1823).

§

*Vampyrops recifinus*, sp. n.

Allied to *V. lineatus* and *V. zarhinus*. Striping strongly marked, the upper white facial line broad and conspicuous, the lower evident, and the dorsal line clear and continuous. Nose-leaf much as in *V. zarhinus*, the sides of the horseshoe with an infolded lobule about their centre. Distribution of fur, shape of ears and tragus as in *V. zarhinus*. General colour brown, rather paler below. Wing-bones white, contrasting with the brown membranes.

Skull shaped as in *V. zarhinus*, and with the same minute and separated

*Ametrida centurio*, Gray.

One.

*Sturnira lilium*, Geoff.

One.

*Desmodus rotundus*, Geoff.

One.

## XXVIII.—*The Rutelid Genus Adorodocia*.

By GILBERT J. ARROW.

To my great regret I have to announce that subsequent evidence, coming, unfortunately, just too late for the correction or recall of my paper in the 'Annals' of July last, has shown me that the conclusions there expressed are wrong in certain vital respects, in consequence of which the new genus and species there characterized become superfluous. Mr. Fred Bates kindly permitted me to make a careful examination of the specimens in his collection, which includes all the three forms referred to in my paper, together with an individual representing a fourth form which at once showed the necessity for reviewing my conclusions as to the sexes.

The British Museum contained altogether seven specimens, of which the type of *Adorodocia strigata*, Waterh., and two other specimens identical with it, I found by dissection to contain ova. Of the second form there were also three specimens, in which I found no ova, but the remarkable chitinous structure shown at *c* and *d* in the woodcut. This form agreed with the description of *A. vittaticollis*, Fairm., considered by both authors to be conspecific with *A. strigata*,

incisors, but conspicuously larger throughout. Last upper molar transversely oval. Second lower molar slightly larger in section than the first, the third one nearly half its size.

Dimensions of the type (measured on a specimen in spirit):—

Forearm 41 millim.

Head and body 57; nose-leaf  $11 \times 5.5$ ; ear 15; third finger, metacarpal 38; first phalanx 14.5, second phalanx 24; lower leg 16; calcar 3.5; depth of interfemoral in centre 4.

Skull: greatest length 24; basal length 19; breadth of palate across molars 10.5; front of canine to back of  $m^2$  8.4.

*Hab.* Pernambuco.

*Type.* Male. B.M. no. 81.3.16.4. Collected and presented by the late W. A. Forbes.

This species may be readily distinguished from *V. zarhinus* by its larger size and more prominent striping, and from *V. lineatus* by its minute incisors.

Waterh., while the greater development of the head and the fissure in the apical segment of the abdomen, in addition to the absence of ova, seemed certainly to point to it as the male of that form. The last specimen, of a much narrower shape, had a less developed clypeus, a different claw-structure, and no trace of the abdominal fissure, and upon dissection it alone proved to contain a genital organ of the normal male type. It was an isolated form not previously described, and for it I saw no alternative but to constitute a new genus.

The examination of additional specimens, however, showed this to be a case in which reasoning from analogy had proved misleading. A specimen was found which, upon comparison with the second form mentioned above, rendered it almost certain that they were the two sexes of one species. It contained a male organ similar to that of the supposed new species, and upon further investigation specimens were found containing ova together with the other sexual structure. This, therefore, it now appeared, was in reality the ovipositor. Upon further examination I found a minute structure of the same type present in the true *A. strigata*, of which the male remained still unknown. Eleven specimens of this form were all of the same sex, and as twelve of the form *ænigma*, Arrow, which I have now, by Mr. F. Bates's kindness, been able to examine, prove to be all males, the two occurring in the same collections, it can, I think, be safely assumed, notwithstanding all dissimilarities, that these also are the two sexes of a single species.

The other species, so long confused with *A. strigata*, shows less sexual disparity and, this question of sexual forms once disposed of, is an unmistakably distinct insect. It is normally larger, broader, and darker in colour, with a triangular head, from which the eyes do not project laterally. This species may, I think, with practical certainty be identified as *A. vittaticollis* of Fairmaire. Unfortunately the type of this and allied Madagascan species described by that author cannot be traced, as M. René Oberthür has kindly ascertained for me; but although M. Fairmaire's specimen appears to have been smaller than any I have seen, his reference to the much-thickened lateral margin of the prothorax and the inner pair of black spots near the hind margin appear to undoubtedly indicate this insect.

Herr Brenske has had the great kindness to send me his specimens, and so enabled me to determine the correct nomenclature of these species. As I supposed, *Adorodocia strigata*, Waterh., is the insect called by him *A. latissima*, while *A. maxima*, Brenske, was described from a female specimen

of the second species. It is pale in colour and shows no traces of thoracic marking; but this is evidently due to immaturity.

The history of these two unfortunate species has been a continuous series of erroneous suppositions, and curiously illustrates the dangers attending systematic work undertaken without an abundance of materials. Having been almost simultaneously described without investigation of their more important structural features, they were soon after wrongly announced by M. Fairmaire to be identical. They were then referred by Herr Brenske to his new genus under the wrong name of *latissima*, Blanch. (an insect redescribed as *Adoretus eunectoides*, Fairm.), and the redundant name of *maxima*, Brenske. They were next declared by Fairmaire, under some strange misapprehension, to have no relationship to that genus. Finally, by myself, still supposing the two names to be synonymous, the male of one of them has been generically separated.

In the hope of setting the matter finally at rest, I give the characters of each sex of both species in a tabular form, together with those of the genus, which was incompletely diagnosed from the female sex alone.

#### ADORODOCIA, Brenske.

Elytra furnished with a conspicuous membranous fringe. Prosternum strongly raised behind the front coxæ, forming an anvil-shaped process. Mesosternum acute, not produced. Labrum rostriform. Labium anteriorly emarginate.

♂. Anterior tibiæ long, third tooth obsolete. Larger claw of four anterior legs very slightly cleft beyond the middle. Last abdominal segment smooth, emarginate.

♀. Anterior tibiæ shorter, tridentate. Claws less unequal, larger claw of four anterior legs equally cleft at the tip. Last abdominal segment rugose, more or less cleft at the hind margin.

Elytra flavous; head, thorax, and scutellum in a greater or less degree darker. Clypeus semi-circular, eyes prominent. Pronotum marked with a black lateral line ..... *strigatus*, Waterh.

♂. Elongate. Eyes more prominent. Pronotum less convex. (*ænigma*, Arrow.)

♀. Ovate. Eyes less prominent. Pronotum convex.

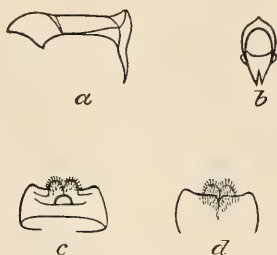
Castaneous, uniformly coloured above. Pronotum marked with a black lateral line and an inner spot, lateral margin strongly thickened. .... *vittaticollis*, Fairm.

♂. Rather elongate. Pronotum flat.

♀. Broader. Pronotum slightly convex. (*maxima*, Brenske.)



It is probable that other described Madagascan insects belong also to the genus.



Genitalia of *Adorodocia*.

*a*, ♂, lateral view; *b*, end view.  
*c*, ♀, ventral view; *d*, dorsal view.

In order more effectually to correct my mistake as to the genitalia of these insects, I reproduce here the figures given last month, with the correct description of them.

XXIX.—*A Revision of the Butterflies of the Genus Precis, with Notes on the Seasonal Phases of the Species.* By ARTHUR G. BUTLER, Ph.D.

DURING a recent rearrangement of the Museum collection of the genus *Precis* I paid particular attention to the seasonal variation of the species, which, as Mr. Guy A. K. Marshall and others have pointed out, are often very remarkable. I found that by carefully studying the characters already noted by observant collectors there was in no case any difficulty in distinguishing the dry and wet phases, although the determination of the intermediate phase was necessarily somewhat arbitrary.

In the African forms of *Precis* the wet phase is, I believe, invariably smaller than the dry phase; but in the Oriental types this rule is usually reversed. This would tend to show that the dry phase in Africa had been better nourished and probably been a shorter time in the pupal condition than that of the Asiatic and Australasian forms.

The dry phase throughout the genus tends to have a more falcate form of front wing and a far more leaf-like character of under surface than the wet phase; in many species also the ocelli on the wings are reduced to mere points in the dry season, as in the *Satyrinæ*.

In several cases where it had been surmised that one

described form was a seasonal phase of another I have been able to establish the fact by the discovery of the intermediate phase. I am therefore certain that my study of this interesting genus will prove useful to lepidopterists.

As regards the species or subspecies which I have kept separate, I do not propose to make any dogmatic statement. I believe that the various forms of the *P. orithya* group are constant in certain characters, slight though the differences may sometimes be; but whether they be regarded as species or local forms is a matter for individual judgment. I never could define the exact amount of constant difference which was necessary to distinguish a local form from a species. At the same time in the forms of *P. erigone* which I have named, the differences being mostly indicated by tint, I think all will be agreed that they are no more than local modifications, even if they prove to be absolutely constant, as I think they will. On the other hand, the named forms of *P. almana* are certainly not constant.

### 1. *Precis villida*.

*Papilio villida*, Fabricius, Mant. Ins. ii. p. 35 (1787).

*Papilio velleda*, Fabricius, Ent. Syst. 3, p. 91 (1793).

*Junonia vellido*, Kirby, Cat. Diurn. Lep. p. 188 (1871).

*Vanessa calybe*, Godart, Enc. Méth. ix. p. 317 (1819).

*Cynthia hampstediensis*, Stephens, Ill. Brit. Ent. i. p. 48, pl. v. figs. 3, 4 (1827).

*Wet phase*.—Gilbert, Ellice, and Navigator Islands, and Viti Levu. B. M.

*Intermediate wet*.—Aneiteum, Vaté, Ovalau, Mango, New Ireland, New Guinea, Tasmania, Port Darwin. B. M.

*Intermediate dry*.—Java, Christmas Island, Roebuck Bay, Sydney, Moreton Bay, Champion Bay, Toowoomba, Port Darwin. B. M.

*Dry phase*.—Condillac Island, near Lord Howe's Island, Tasmania, Queensland.

The wettest development of the species is found in the Ellice Islands and the driest in Tasmania.

### 2. *Precis vestina*.

*Junonia vestina*, Felder, Reise der Nov., Lep. iii. p. 398 (1867).

Bolivia and Ecuador (Coll. Hewitson); Peru. B. M.

So far as I have been able to judge this is an insect only having a dry-season phase; at any rate, all the examples which I have seen represent that phase, even when obtained during the rainy season; there is, however, a variation in the

ground-colour of the under surface from rosy clay-colour to ashy grey, which may be seasonal.

When quite fresh this insect bears a remarkable superficial resemblance to *Vanessa urticæ* of Europe.

### 3. *Precis Hübneri*.

*Precis Hübneri*, Kirby, in Hübner's Exot. Schmett. ed. 2 (1900), p. 24.

*Hamadryas decora evarete*, Hübner, Exot. Schmett. i. pl. lii. figs. 1, 2.

*Junonia lavinia*, Staudinger, Exot. Schmett. pl. xxxvii.

Rio Janeiro and Pará. B. M.

This insect undoubtedly differs considerably from *P. lavinia* of Cramer, the white belt across the primaries being entirely replaced by tawny orange; in the dry phase the orange banding almost entirely disappears, with the exception of the bars across the discoidal cell.

Although it is possible that the white belt in Cramer's figures may only indicate a rare variation answering to *P. genoveva* (of which *P. flirtea* is a tawny-banded form), the lack of examples from Surinam renders it impossible to be certain.

### 4. *Precis occidentalis*.

*Junonia occidentalis*, Felder, Wien. ent. Monatschr. vi. p. 110 (1862).

*Junonia pallens*, Felder, Reise der Nov., Lep. iii. p. 401 (1867).

Pará and Buenos Ayres. B. M.

The primaries, especially of the males, are more produced and the entire colouring of both surfaces is much paler than in *P. Hübneri*. Without positive evidence it would be premature to regard it as a variety of that insect, just as it would be to assume that *P. Hübneri* was a variety of *P. lavinia*.

### 5. *Precis hilaris*.

*Junonia hilaris*, Felder, Reise der Nov., Lep. iii. p. 400 (1867).

Paraguay.

We do not possess this insect, and therefore I cannot express an opinion as to its distinctness from *P. lavinia*.

### 6. *Precis lavinia*.

*Papilio lavinia*, Cramer, Pap. Exot. i. pl. xxi. C, D (1775).

*Papilio larinia*, Fabricius, Ent. Syst., Suppl. p. 424 (1798).

*Junonia negra*, Felder, Reise der Nov., Lep. iii. p. 399 (1867).

*Junonia divaricata*, Felder, t. c. p. 401 (1867).

Surinam and Rio Negro.

We do not possess typical examples of this species, and therefore cannot assert that the preceding three named forms are distinct.

7. *Precis evarete*.

♀. *Papilio evarete*, Cramer, Pap. Exot. iii. pl. cciii. C, D (1782).

*Papilio genoveva*, Cramer, Pap. Exot. iv. pl. ccxc. E, F (1782).

*Papilio esra*, Fabricius, Ent. Syst., Suppl. p. 425 (1798).

*Junonia zonalis*, Felder, Reise der Nov., Lep. iii. p. 399 (1867).

*Junonia incarnata*, Felder, t. c. p. 595 (1867).

Var. *Papilio flirtea*, Fabricius, Ent. Syst. iii. 1, p. 90 (1793).

*Junonia oriana*, Kirby, in Hübner's Exot. Schmett. ed. 2 (1900), cf. Hübner, vol. i. pl. l. figs. 3, 4.

West Indies, Central America, and Bogota. B. M.

This species has always gone by the name of *P. genoveva*; but *P. evarete* seems to me to be clearly the female of the dry phase of this species, males of which we have from Honduras and Nicaragua. *P. zonalis*, of which we have a male from Bogota, is an intermediate phase with rather a broad oblique belt across the primaries; *P. flirtea* is a form in which the oblique band on the primaries becomes opaque and tawny ochreous—we have it from the island of Dominica, Honduras, the Polochic Valley, and Mexico. I have not regarded it as distinct, because it evidently occurs with *P. genoveva* in Honduras and Central America; but a study of the early stages may prove it to be so.

8. *Precis constricta*.

*Junonia constricta*, Felder, Reise der Nov., Lep. iii. 1, p. 400 (1867).

Bogota. B. M.

In this insect the oblique band across the primaries from the costal vein to the ocellus is very narrow and the general colour is slightly paler than in typical *P. evarete*. In the absence of examples tending to link it to the latter, it seems better to regard it as distinct.

9. *Precis fuscescens*, sp. n.

General character of *P. evarete*, but the forked belt on the primaries and submarginal orange belt on the secondaries narrow and more or less suffused with brown, that of the secondaries wanting in the dry phase; ocelli of primaries without orange irides; the dry phase also without orange in cell-spots.

Expanse of wings 54–58 millim.

Porvenir, Ecuador, and Quito. B. M.

10. *Precis infuscata*.

*Junonia infuscata*, Felder, Reise der Nov., Lep. iii. p. 401 (1867).

*Junonia basifusca*, Weymer, in Stubel's Reise, p. 120, pl. iii. fig 7 (1890).

Guayaquil. B. M.



The dry phase of this species loses all the defined brown belts from the under surface of the secondaries, which become almost uniformly lilacine grey traversed by brownish lines. The bands above are rather pale buff than pale brown, as Felder describes them.

### 11. *Precis cænia*.

*Junonia cænia*, Hübner, Samml. exot. Schmett. ii. pl. xxxii. (1816-24).

*Wet phase*.—Texas, Bermudas. B. M.

*Intermediate phase*.—California. B. M.

*Dry phase*.—California and Bermudas. B. M.

In the driest phase the under surface of the secondaries is rosy clay-coloured.

There is generally no difficulty in distinguishing this at a glance from *P. evarete*, on account of the great disproportion in the size of the ocelli on the secondaries, but the white inner border to the posterior ocellus on the primaries is a still more reliable character; the secondaries on the under surface differ considerably in the two species, the ground-colour being much darker in *P. evarete*, the wet phase showing a defined straight pale band across the middle, sharply defined ocelli, and pale external area.

The species of the succeeding group are nearly related, and consequently have generally been confounded, even such experienced entomologists as Messrs. de Nicéville and F. Moore having failed to note the distinctions which separate the Chinese *P. orithya* from the Indian *P. Swinhoei*. The differences of all the forms, which appear to be locally constant, are such as are nowadays frequently regarded as subspecific; it is, however, as already observed, impossible to define the exact amount of constant difference which is required to indicate whether a separate evolution be regarded as a species or a subspecies, so I separate all these constantly differing forms as species.

### 12. *Precis orithya*.

*Papilio orithya*, Linnæus, Mus. Lud. Ulr. p. 278 (1764).

*Junonia Leechi*, Alpheraky, Rom. Mém., Lép. ix. p. 103 (1897).

Western and Northern China, Foo Chow, Hong Kong, Hainan, Formosa, Madjico Sima, Loo-Choo. B. M.

The Chinese insect is, as a rule, larger than the Indian one, the males show barely a trace of the blue patch at external angle of the primaries above, the outer border is less suffused with blue and frequently shows no trace of this suffusion, whereas in *P. Swinhoei* this suffusion is rarely absent; the ocelli on

the secondaries of the female are usually very large, sometimes even connected, and have large pearly blue centres; the external half of the female is often ashy fuliginous instead of blue, the orange markings on all the wings above being well developed in this variety. The under surface of the males is greyer below and *that of the females shows much more orange-tawny on the secondaries* than in *P. Swinhoei*. In the dry phase the under surface of the secondaries varies from vinous ash to different shades of rufescent ashy brownish; in *P. Swinhoei* the variation is much greater, the secondaries sometimes heavily lined and banded, sometimes almost white, with the markings much divided up. Leech's figures show the seasonal phases fairly well.

### 13. *Precis Royeri*.

♀. *Vanessa Royeri*, Vollenhoven, Tijds. voor Ent. iv. p. 157, pl. viii. figs. 1, 2 (1861).

♂. *Junonia orbitola*, Swinhoe, Ann. & Mag. Nat. Hist. (6) xii. p. 207 (1893).

Var. ? *Junonia orithyia*, var. *neopommerana*, Ribbe, Iris, vol. xi. p. 116 (1898).

♂ ♂, Saparea Island and New Guinea. B. M.

The well-defined orange belt on the under surface of the secondaries at once determines this species; there is no other form with the same character. The female, as figured by Vollenhoven, is also very characteristic.

### 14. *Precis ocyale*.

♂ as ♀. *Junonia ocyale*, Hübner, Samml. exot. Schmett. ii. pl. xxxiii. figs. 3, 4 (1816-1824).

Java and Celebes. B. M.

Hübner figures two males under this name: figs. 1, 2 represent the intermediate phase of *P. Swinhoei*, so that figs. 3, 4 will retain his name (as understood by recent authors); they represent the dry phase, each sex of the wet phase showing a great deal of reddish orange on both surfaces.

### 15. *Precis Wallacei*.

*Junonia Wallacei*, Distant, Rhop. Mal. p. 95, pl. xi. figs. 3, 4 (1883).

Malacca (*Pinwill*), Sarawak (*Bartlett*). B. M.

The Philippine form may possibly belong to this type, but we only have a male of it. The females of *P. Wallacei* are very characteristic, the outer half of the secondaries being either buff or ashy brownish instead of blue; the oblique belt on the primaries of both sexes is creamy white and barely interrupted by a few orange scales.

16. *Precis albicincta*.

*Junonia albicincta*, Butler, Trans. Ent. Soc. 1875, p. 5.

N. Australia, Baudin, Damma, and Semaio Islands. B. M.

The borders of the males are *very white* and destitute of blue scaling, the seasonal forms well defined; the ocelli in both sexes above small.

17. *Precis Swinhoei*.

*Junonia Swinhoei*, Butler, Ann. & Mag. Nat. Hist. (5) xvi. p. 309 (1885).

*Junonia Alleni*, Kirby, Hübner's Exot. Schmett. ed. 2, pl. 246 (33), figs. 1, 2 (1900).

India and Burma. Type, B. M.

This is generally a small species with well-defined blue patch at external angle of primaries in the male.

18. *Precis here*.

*Junonia here*, Lang, Entom. xvii. p. 207 (1884).

Bagdad (*Loftus*), Aden (*Yerbury*). Type, B. M.

This form differs chiefly from *P. Swinhoei* in the distinctly bluer outer border to the secondaries; it appears only to have a dry phase. From *P. boopis* it is more difficult to separate it, the orange iris to the upper ocellus of the primaries, upon which Mr. Lang partly relied, being not quite a constant character; it is more uniformly small than *P. boopis*, and is perhaps rather paler on the under surface, but to all intents and purposes it is a mere local race of that form. As regards size, we have much smaller examples of the nearly related *P. Swinhoei*, only *P. here* appears to vary very little in this respect, and the absence of wet and intermediate phases may perhaps be allowed to weigh somewhat as a reason for regarding it as subspecifically distinct from *P. boopis*.

19. *Precis boopis*.

*Junonia boopis*, Trimen, Trans. Ent. Soc. 1879, p. 331.

Eastern Africa from north to south. B. M.

20. *Precis clelia*.

*Papilio clelia*, Cramer, Pap. Exot. i. pl. xxi. E, F (1775).

Africa generally and Aden. B. M.

The seasonal forms are well-defined by the colouring of the under surface, the wet phase having the central pale belt across the middle of the secondaries well-defined by the

darkening of the subbasal markings and discal area, the small ocelli on this area being tolerably sharply outlined; in the intermediate phase the central belt and border are not so white, and many of the specimens show a slight rosy suffusion; in the dry phase the ocelli on the under surface are, as a rule, reduced to mere points, the general character of colouring is more leaf-like, varying from rosy brownish to ochreous brownish, the darker areas frequently much less defined. The tendency in the dry phase evidently is for the resting butterfly to resemble a dead leaf.

21. *Precis epiclelia*.

*Vanessa epiclelia*, Boisduval, Faune Ent. de Madag. p. 44, pl. vii. fig. 3 (1833).

Madagascar (Betsileo). B. M.

This is an island form of *P. clelia*, differing chiefly in the reduced size of the creamy-white markings on the primaries. As with other species found in Madagascar, the seasonal phases seem to be less defined than in those from the continent of Africa.

22. *Precis ænone*.

*Papilio ænone*, Linnæus, Mus. Lud. Ulr. pp. 274, 275 (1764).

*Papilio hierta*, Fabricius, Ent. Syst., Suppl. p. 424 (1798).

China, Burma, Pegu, Mergui, Andamans, Nicobars, Ceylon, India generally. B. M.

Specimens from China are so large that they might be regarded as representing a distinct subspecies if it were not for the existence of occasional equally large examples from Northern India; the Museum has such examples from Karachi in the west and Assam in the east.

The seasonal phases differ in the usual way, the markings in the wet phase on the under surface being fairly well defined, but in the dry phase blurred on the secondaries, which are of a more uniformly greyish ashy tint.

23. *Precis cebrene*.

*Junonia cebrene*, Trimen, Trans. Ent. Soc. 1870, p. 353. ("cebrene," Dunning, t. c. p. 524.)

Africa generally and Aden. B. M.

The seasonal phases differ much as in *P. ænone*, but the differences between the extremes are perhaps a little more pronounced.



24. *Precis paris*.

*Junonia paris*, Trimen, S. African Butt. i. p. 212 (1887).

Madagascar.

I have not seen this species, but it is said to differ from *P. cebrene* in the broader basal black area on the upper surface of the primaries showing two blue striæ in the discoidal cell and the consequent reduction of the ochreous area on these wings. The blue spot on the secondaries is described as being larger, not violaceous and prolonged outwardly on the radial vein; but these characters may prove to be inconstant if one may judge of them by what we see in the closely related *P. ænone* and (to some extent) in *P. cebrene*.

25. *Precis Westermanni*,

*Junonia Westermanni*, Westwood, Ent. Mo. Mag. vi. p. 278 (1870);  
Thesaurus Oxon. p. 182, pl. xxxiv. figs. 7, 8 (1874).

Western and Eastern Africa, ♂ ♂ ♀ ♀. B. M.

Although the pattern of the under surface in the wet phase of this species somewhat approaches that of *P. sophia*, the upper-surface colouring would bring it next to *P. paris*. As a matter of fact *P. Westermanni* and *P. hadrope* stand quite alone, the sexes in both being utterly dissimilar. A female of *P. Westermanni* was secured by the late Mr. Philip Crowley, and we have recently received two others; and *P. ixia*, of which the Museum possesses the type, is evidently the female of *P. hadrope*.

The dry phase of *P. Westermanni* is smaller than the wet phase, and the secondaries on the under surface are rufescent, with rufous-brown, instead of black, markings, and with a slightly silvery triangular costal patch.

26. *Precis sophia*.

*Papilio sophia*, Fabricius, Ent. Syst. iii. 1, p. 248 (1793).

Western Africa generally. B. M.

What appears to be the dry phase of this species is evidently a rare insect, in which the upper surface is almost black, with the discal bands white, so that it looks remarkably like a tiny form of *Panopea lucretia*. In the Museum collection are two examples of a phase intermediate between this and the normal wet phase.

27. *Precis infracta*.

*Junonia infracta*, Butler, P. Z. S. 1888, p. 63.

Eastern and E. Central Africa. Type, B. M.

The phases appear to differ much as in *P. sophia*, excepting that the intermediate and dry phases are far less rare.

### 28. *Precis hadrope*.

♂. *Junonia hadrope*, Westwood and Hewitson, Gen. Diurn. Lep. pl. xxv. fig. 2 (1847).

♀. *Junonia ixia*, Butler, Ent. Mo. Mag. ii. p. 227 (1866).

Western Africa. Types, B. M.

From the material which we possess it is impossible to be certain as to the seasonal differences; but it would seem that the ocelli are reduced and the under surface of the secondaries becomes paler and less distinctly marked in the dry phase.

### 29. *Precis octavia*.

*Papilio octavia*, Cramer, Pap. Exot. ii. p. 60, pl. cxxxv. B, C (1777).

*Papilio amestris*, Drury, Ill. Exot. Ent. iii. p. 26, pl. xx. figs. 3, 4 (1782).

Western and Northern Africa to the Albert Nyanza and Somaliland on the East. B. M.

We have a perfect gradation from the extreme wet phase *P. octavia* to the extreme dry phase indistinguishable from *P. sesamus*; of the latter, however, we have only one imperfect example from Onitsha on the Niger, the ordinary dry phase of the West Coast being represented by a less blue form—*P. amestris*. In *P. octavia*, which never attains to the size or rich colouring of its Eastern representative, the belt crossing the end of the cell in the primaries is generally unbroken, whereas in *P. natalensis* it is always widely interrupted.

### 30. *Precis sesamus*.

*Precis sesamus*, Trimen, Trans. Ent. Soc. 1883, p. 347; S. Afr. Butt. i. p. 231, pl. iv. fig. 3 (1887).

*Precis octavia*, var. *natalensis*, Staudinger, Exot. Schmett. i. p. 101 (1885); also *P. amestris*, var. *cafraria*, pl. xxxviii.

*Junonia calescens*, Butler, P. Z. S. 1893, p. 652 (1894).

*Precis sesamus* (int. phase), Butler, P. Z. S. 1900, p. 916, pl. lviii. fig. 1.

Southern and Eastern Africa. B. M.

The gradual transitions between the extreme phases of this form do not seem to exist, as in the western *P. octavia*; the intermediate phase seems always to show a mass of salmon-colour on the upper surface and to vary chiefly in the distribution of the blue colour which connects it with the typical dry phase.

31. *Precis antilope*.

*Salamis antilope*, Feisthamel, Ann. Soc. Ent. Fr. 1850, p. 250.

*Precis simia*, Wallengren, Kongl. Svensk. Vet.-Akad. Handl. 1857, Lep. Rhop. Caffr. p. 26.

*Precis ibris*, Felder, Reise der Nov., Lep. p. 403 (1867).

*Precis Petersi*, Dewitz, Nov. Ac. Acad. Nat. Cur. xli. 2, p. 192, pl. xxv. fig. 14 (1879).

*Junonia micromera*, Butler, Ann. & Mag. Nat. Hist. (4) vol. xviii. p. 482 (1876).

Eastern and Southern Africa. B. M.

*P. antilope* is the dry phase and *P. simia* (= *micromera*) the wet. We possess an intermediate phase approaching nearest to *P. antilope*. From *P. cuama*, with which the dry phase has been confounded, there is no difficulty whatever in distinguishing it. The wings in all phases of *P. antilope* are shorter, the pink belt on the secondaries of the males wanting, as also the subapical white spots on the dry phase; there are other constant, though less evident, differences.

32. *Precis cuama*.

*Junonia cuama*, Hewitson, Exot. Butt., Jun. pl. i. figs. 4, 5 (1864).

*Junonia Trimeni*, Butler, P. Z. S. 1893, p. 651, pl. ix. fig. 4 (1894).

East Africa southwards to Mashonaland. B. M.

*P. cuama* is the dry phase and *P. Trimeni* the wet. We have several transitional examples. As to *P. cuama* being an aberration of *P. antilope*, that is out of the question, from the constancy of all its characters in both wet and dry phases and in the fact that it is quite as abundant (where it occurs) as *P. antilope*.

33. *Precis ceryne*.

*Salamis ceryne*, Boisduval, Voy. Deleg. ii. p. 592 (1847).

Southern and Eastern Africa. B. M.

The dry phase differs in the much more pronounced angles to the outer margins of the wings, in the much more uniform redder colouring of both surfaces, with less prominent white discal spots and absence of white submarginal lunules. We have two transitional examples.

34. *Precis pelarga*.

*Papilio pelarga*, Fabricius, Syst. Ent. p. 513 (1775).

*Papilio leodice*, Cramer, Pap. Exot. ii. pl. cxxxviii. G, H (1779). Cf. also Aurivillius, Rhop. Æthiop. pp. 138, 139, for other synonyms.

*Vanessa laodora*, Godart, Enc. Méth. ix. p. 314 (1819).

*Vanessa Galami*, Boisduval, Faune Ent. de Madag. p. 46 (1833).

*Precis monroviaana*, Staudinger, Exot. Schmett. p. 100 (1885).

Western and Equatorial Africa. B. M.

The wet form is small, and is doubtless the *P. Galami* (described, by comparison with *P. andremicja*, in the Faune Ent. de Madagascar); in this form both sexes have a more or less fulvous belt across the wings, sometimes white washed with fulvous, as M. Boisduval says. In the dry form, which is much larger and with strongly falcate primaries, the male has an orange belt touched with bluish white towards the abdominal margin; the female has the belt blue, with tawny orange outer border.

### 35. *Precis actia*.

*Precis actia*, Distant, P. Z. S. 1880, p. 185, pl. xix. fig. 7.

♀. *Precis vetula*, Staudinger, Exot. Schmett. i. p. 101 (1885).

East Africa. B. M.

The dry phase is the one described, and differs markedly from that phase of *P. pelarga* in always showing more or less blue inner shading to the discal belt in both sexes, and in the double angulation of the outer edge of the brown basal three fifths of the primaries. The wet phase is probably confounded in most collections with *P. Galami*, from which the double angulation of the outer edge of the basal area and the pure white defined belt which occupies the inner two thirds of the discal belt in the female at once distinguish it. We have two examples of an intermediate phase from Nyasaland in which both sexes show a slight shade of blue on the more restricted white portion of the discal belt towards the abdominal margin of secondaries, but retain the non-falcate form of primaries.

We now come to a group of species in which the colouring of the upper surface is tolerably uniform at all seasons and that of the under surface always more or less leaf-like in character. One of these, which used to be widely separated from *Precis* and placed near *Kallima*, I characterized as a new genus under the name of *Coryphæola* in 1878; but Prof. Aurivillius has correctly pointed out (Rhop. Æthiop. p. 131) that it agrees both in structure and character of marking with *Precis*.

### 36. *Precis sinuata*.

*Precis sinuata*, Plötz, Stett. ent. Zeit. 1880, p. 477.

*Precis pelargoides*, Aurivillius, Ent. Tidskr. xii. p. 204 (1891).

*Precis serena*, Weymer, Stett. ent. Zeit. 1892, p. 86.

West Africa. B. M.

I have no doubt, if I have correctly identified *P. pelargoides*, that it represents the wet phase of this species, from



which it differs in its inferior size, less falcate primaries, more opalescent discal belt, deeper coloured more varied under surface, with submarginal pearly white lunules; the primaries washed with purplish.

### 37. *Precis milonia*.

*Precis milonia*, Felder, Reise der Nov., Lep. p. 403 (1867).

*Precis kowara*, Ward, Ent. Month. Mag. viii. p. 22 (1871); Afr. Lep. p. 6, pl. v. figs. 5, 6 (1873).

Var.?, *Junonia raavana*, Gr.-Smith, Nov. Zool. v. p. 352 (1898).

West and East Africa. B. M.

I have only seen the wet phase of this species, of which there are four examples from the Cameroons in the Hewitson Collection. The dry phase should be larger than the wet, with more falcate primaries and with the under surface more plainly coloured, but with a better-defined dark central line across the wings, if it differs as in the allied species.

### 38. *Precis aurorina*.

*Junonia aurorina*, Butler, P. Z. S. 1893, p. 651, pl. lx. fig. 3.

East Africa from Natal to Munisu, Brit. E. Africa. Type, B. M.

This insect runs somewhat close to *P. tugela*, of which it has been regarded as the wet phase. We, however, possess forms representing the wet, intermediate, and dry phases of both, and to unite them as one species would greatly complicate this already difficult group, by proving that in each phase forms with more or less falcate primaries occurred. Therefore until the identity of *P. aurorina* and *P. tugela* can be proved by breeding one from eggs laid by the other, it seems to me more convenient to regard them as different species. In what I call the wet phase of *P. aurorina* the primaries are angulated, the secondaries below are largely ochreous, the whole discal belt being of that colour; in the supposed dry phase the primaries are slightly falcate and the wings below are bright chestnut, irrorated with purplish ash on basal area and external border. We have a long series of an intermediate phase.

### 39. *Precis tugela*.

*Precis tugela*, Trimen, Trans. Ent. Soc. 1879, p. 334; S. Afr. Butt. i. p. 241, pl. iv. fig. 5 (1887).

Natal to Nyasaland. B. M.

This always has the primaries strongly falcate and with a long process; but in what I regard as the wet phase the

process is considerably reduced and the apex more angular, the apical portion of the wing from below the falcation to the costal margin being distinctly broader; the under surface with more distinct transverse markings than in the dry phase, without the olivaceous suffusion or sharply defined yellow central line. It is, of course, possible that *P. tugela* may have six developments from extreme wet to extreme dry, and that the first three may represent *P. aurorina* and the last three *P. tugela*, only there is rather a wide break between the third and fourth of these forms, which makes me hesitate to unite them.

#### 40. *Precis pyriformis*.

*Junonia pyriformis*, Butler, P. Z. S. 1895, p. 726, pl. xlii. figs. 5 & 6 (1896).

East Africa. Type, B. M.

The wet phase is considerably smaller than the dry, has the primaries subfalcate in the male, falcate in the female; the under surface with tolerably defined markings upon a tawny ground, which is slightly washed with lilac on basal area and near to outer margin: the dry phase has the primaries falcate and with well-defined process in both sexes; the under surface with ill-defined markings on a slightly opaline clay-coloured ground. We also have an intermediate phase.

#### 41. *Precis eurodoce*.

*Kallima eurodoce*, Westwood, Gen. Diurn. Lep. p. 325, note, pl. liv. fig. 1 (1850).

Madagascar.

The wet phase is smaller than the dry, the apex of the primaries subfalcate; the dry phase has the primaries falcate and produced into a long process. Indeed, the seasonal differences in this species are so marked that it would not take much to convince me that *P. aurorina* and *P. tugela* were forms of one extremely variable species. The wettest phase of *P. aurorina* does not differ more from the driest phase of *P. tugela* than do the wet and dry phases of *P. eurodoce*. By the way, why did not Prof. Aurivillius include this in his collection under *P. milonia*? It differs no more than the other species do.

#### 42. *Precis cælestina*.

*Precis cælestina*, Dewitz, Nov. Act. Acad. Nat. Cur. xli. 2, p. 193, pl. xxv. fig. 13 (1879).

Northern road to Uganda. B. M.

We have only a dry phase of this species. It nearly approaches *P. chapunga* (an intermediate phase of *P. archesia*), but is, I believe, a good distinct species.

#### 43. *Precis archesia*.

*Papilio archesia*, Cramer, Pap. Exot. iii. p. 44, pl. ccxix. D, E (1779).

*Precis Staudingeri*, Dewitz, Nov. Act. Acad. Nat. Cur. xli. 2, p. 193, pl. xxv. fig. 15 (1879).

*Vanessa pelasgis*, Godart, Enc. Méth. ix., Suppl. p. 820 (1823).

*Junonia chapunga*, Hewitson, Exot. Butt., *Junon*. pl. i. figs. 2, 3 (1864).

*Precis semitypica*, Aurivillius, Rhop. Æthiop. p. 140 (1898).

S. Africa, northwards to the Victoria Nyanza. B. M.

This species is represented by about seven gradations, the extreme wet phase being *P. pelasgis*; next comes a form with similar pattern on both surfaces, excepting that the orange belt is greatly reduced in width; then *P. chapunga*, followed by *P. semitypica*, *P. archesia* (a larger form, with more conspicuous whiter spots on the primaries), and, lastly, *P. Staudingeri*, the extreme dry phase.

It seems a strange thing that my excellent friend Prof. Aurivillius, who was well aware of the above variability in *P. archesia*, failed to recognize the fact that the nearly related *P. limnoria* was subject to similar variation.

#### 44. *Precis limnoria*.

*Vanessa limnoria*, Klug, Symb. Phys. pl. xlviii. figs. 6, 7 (1845).

*Vanessa naib*, Guérin, in Lefebvre's Voy. Abyss. pl. xi. figs. 1, 2 (1849).

*Precis taveta*, Rogenhofer, Ann. Hof-Mus. Wien, vi. p. 460, pl. xv. fig. 7 (1891).

*Precis guruana*, Rogenhofer, Verh. zool.-bot. Ges. Wien, xli. p. 564 (1891).

Eastern and Northern Africa. B. M.

We have six grades of this species, the extreme wet phase being *P. guruana*, followed by two transitions to the next-named form *P. limnoria*; this is followed by *P. taveta* and concludes with *P. naib*, the extreme dry phase.

#### 45. *Precis andremiaja*.

*Vanessa andremiaja*, Boisduval, Faun. Ent. de Madag. p. 45 (1833).

*Vanessa musa*, Guérin, Icon. Règne Anim. p. 474 (1884).

*Precis Galami*, Mabille, in Grand. Madag., Lép. i. p. 137, pl. xiii. figs. 10, 11, pl. xviii. a, figs. 2, 3 (1885-7).

*Precis Boisduvali*, Staudinger, Exot. Schmett. i. p. 100 (1885).

Madagascar. B. M.

We have all gradations between *P. andremiaja*, the extreme wet phase, and *P. Boisduvali*, the extreme dry phase.

46. *Precis terea*.

*Papilio terea*, Drury, Ill. Ex. Ent. ii. pl. xviii. figs. 3, 4 (1773).

Western and Equatorial Africa. B. M.

The dry phase appears to be rare.

47. *Precis tereoides*, sp. n.

Allied to *P. terea*, but the orange belt abbreviated, and only indicated by a more or less diffused streak inside the transverse central dark brown line; primaries as strongly falcated at all seasons as in the dry phase of *P. terea*.

Expanse of wings 48–51 millim.

British E. Africa to the Arusa Galla country. B. M.

48. *Precis elgiva*.

*Junonia elgiva*, Hewitson, Exot. Butt. iii., *Jun.* pl. i. fig. 1 (1864).

*Junonia zipha*, Butler, Cist. Ent. i. p. 7 (1869).

Southern to British East Africa. B. M.

The locality "Old Calabar" for *P. zipha* must have been incorrect; in our long series we have no West-African example at all approaching *P. elgiva*. This species has a more decided dry phase than *P. terea*—leaf-like below and with violaceous tints.

49. *Precis Goudotii*.

*Vanessa Goudotii*, Boisduval, Faune Ent. de Madag. p. 45, pl. vii. fig. 1 (1833).

Madagascar. B. M.

We possess only a rather dry phase of this species.

50. *Precis Gregorii*.

*Junonia Gregorii*, Butler, P. Z. S. 1895, p. 726, pl. xlii. figs. 7, 8.

British East Africa. B. M.

The seasonal phases of this species appear to be very little marked. *P. Gregorii* might almost as correctly be regarded as a form of *P. Goudotii* as of *P. stygia*; but it differs remarkably in outline of wing from both species, although the form of the secondaries is almost that of *P. Goudotii*.

51. *Precis stygia*.

*Precis stygia*, Aurivillius, Ent. Tidskr. xv. p. 275 (1894).

*Precis ethyra*, Staudinger (nec Feisthamel), Exot. Schmett. i. p. 102 (1883).

West Africa. B. M.

The extreme dry phase seems to be very rare. It is leaf-



like below, the markings, excepting the stripe across the middle of the secondaries, being ill-defined. Intermediate forms are commoner, but not abundant.

### 52. *Precis natalica*.

*Precis natalica*, Felder, Wien. ent. Monatschr. iv. p. 106 (1860).

*Junonia chorimene*, Hopffer (nec Guérin), in Peters's Reise n. Mossamb., Ins. p. 381 (1862).

*Junonia hecate*, Trimen, Rhop. Afr. Austr. p. 140, pl. iii. fig. 6 (1862-6).

Southern, Eastern, and Central Africa. B. M.

*P. hecate* is the intermediate phase; the dry phase has all the white spots on the under surface of the primaries suffused with brownish.

### 53. *Precis chorimene*.

*Vanessa chorimene*, Guérin, Icon. Règne Anim. p. 476 (1844).

*Vanessa orthosia*, Klug, Symb. Phys. pl. xlviii. figs. 8, 9 (1845).

*Salamis ethyra*, Feisthamel, Ann. Soc. Ent. Fr. (2) viii. p. 250 (1850).

West Africa. B. M.

*P. orthosia* is the dry phase of the species.

### 54. *Precis iphita*.

*Papilio iphita*, Cramer, Pap. Exot. iii. pl. ccix. C, D (1782).

India and Ceylon, Mergui, Pegu, Burma, China, Malacca, and Borneo. B. M.

The dry phase is smaller than the extreme wet phase and has much more falcated primaries, with more uniform and more violaceous under surface, the ocelli being much reduced in size.

### 55. *Precis intermedia*.

*Precis intermedia*, Felder, Reise der Nov., Lep. iii. p. 402 (1867).

Celebes. B. M.

I cannot admit the identity of this insect with *P. iphita*; the primaries are always more produced. The dry phase differs from the wet in the paler sandy brown under surface without pearly blue bands.

### 56. *Precis ida*.

*Papilio ida*, Cramer, Pap. Exot. i. pl. xlii. C, D (1776).

*Apatura tragia*, Hübner, Verz. bek. Schmett. p. 35 (1816).

*Vanessa idamene*, Godart, Enc. Méth. ix. p. 315 (1819).

Java, "Ceylon, Bombay, Nepaul." B. M.

The dry phase of this species somewhat resembles *P. iphita*, but the pale bands are brighter, yellower; the dark basal area always with nearly straight outer edge.

57. *Precis adelaida*.

*Precis adelaida*, Staudinger, Iris, 1889, p. 51.

*Precis neglecta*, Swinhoe, Ann. & Mag. Nat. Hist. 1899, vol. iii. p. 103.

Borneo and Philippines. B. M.

The wet phase is extremely like *P. ida*, but is slightly more clouded with brown above; typical *P. adelaida* is probably an intermediate phase, the dry phase being similar but smaller and washed with green above.

58. *Precis hedonia*.

*Papilio hedonia*, Linnæus, Mus. Lud. Ulr. p. 279 (1764).

*Precis hellanis*, Felder, Reise der Nov., Lep. iii. p. 402 (1867).

Celebes, Ternate, Mysol, Ceram, Amboina, Ké, Dobbo, Aru, New Guinea, Trobriand, New Britain, New Ireland, Solomon Islands. B. M.

*Precis hellanis* often (probably always) occurs in the same localities with *P. hedonia*, of which it appears to me to be an intermediate phase; no dry phase is known to me.

59. *Precis zelima*.

*Papilio zelima*, Fabricius, Syst. Ent. p. 492 (1775); Donovan, Ins. New Holl. pl. xxiii. fig. 2 (1805).

Australia (Queensland, Adelaide). B. M.

This is the Australian representative of *P. hedonia*; it is smaller, never shows the pale external area of that species, and has a fairly well-marked dry phase; its wet phase nevertheless is remarkably close to Ké Island examples of *P. hellanis*, but is more brightly blue-banded below and has smaller ocelli.

60. *Precis atlites*.

*Papilio atlites*, Johanssen, Amœn. Acad. vi. p. 407 (1764).

*Papilio laomedia*, Linnæus, Syst. Nat. i. 2, p. 772 (1767).

Eastern India, Ceylon, Nicobars, Andamans, Burma, Malacca, Java, Nias, Sumatra, Borneo, Philippines. B. M.

In the extreme dry phase all the markings on the under surface excepting the central band become indistinct; the ocelli small, with barely a trace of the black spots.

61. *Precis antigone*.

*Junonia antigone*, Felder, Reise der Nov., Lep. iii. p. 398 (1867).

*Precis tristis*, Miskin, Blue Book, H.M. Colonial Possessions, no. 103, Brit. New Guinea, pp. 117-124 (1891).

Aru and New Guinea. B. M.

Ann. & Mag. N. Hist. Ser. 7. Vol. viii.

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Miskin's description is not a bad one of undoubtedly this species.

62. *Precis expansa*.

*Precis expansa*, Butler, P. Z. S. 1883, p. 357.

Ké, Damma, Timor, Timor Laut (type; also Coll. Crowley).  
B. M.

63. *Precis erigone*.

*Papilio erigone*, Cramer, Pap. Exot. i. pl. lxii. E, F (1779).

Java. B. M.

The seasonal phases of this species differ much as in other Oriental forms of *Precis*, but the central bar across the secondaries becomes indistinct in the intermediate and dry phases, as do all the markings on these wings, which in the dry phase become of a nearly uniform pale clay-colour, faintly washed with lilac.

63 a. *Precis Walkeri* (local form of *P. erigone*).

Altogether darker and less ochraceous than *P. expansa*; the pale band and spots on the primaries distinctly paler.

Expanse of wings, ♂ 50, ♀ 53 millim.

Semao Island (*J. J. Walker*). B. M.

This is one of the gradations leading to *P. erigone* from *P. expansa*; the following is another:—

63 b. *Precis celebensis* (local form of *P. erigone*).

Differs from *P. erigone* in its slightly more ruddy colouring, the costa of the primaries rather longer, the row of connected ocelli on the secondaries with more brightly orange irides than in the wet phase of *P. erigone*.

Expanse of wings 56 millim.

Celebes. B. M.

64. *Precis lemonias*.

*Papilio lemonias*, Linnæus, Mus. Lud. Ulr. p. 277 (1764).

*Papilio aonis*, Linnæus, Syst. Nat. i. 2, p. 769 (1767).

India, Burma, China, Formosa, Philippines, Lankowi, Penang, Malacca. B. M.

The dry phase is slightly marked and often rosy on the under surface.

65. *Precis timorensis*.

*Junonia timorensis*, Wallace, Trans. Ent. Soc. 1869, p. 346.

*Junonia valesca*, Frühstorffer, Berl. ent. Zeit. xliii. p. 181 (1898).

Timor, Sumba (Crowley Coll.). B. M.

*J. valesca* is the wet phase, as Herr Frühstorffer supposed.

66. *Precis iona*.

*Junonia iona*, Grose-Smith, Novit. Zool. i. p. 350 (1894).

New Guinea (Crowley Coll.). B. M.

67. *Precis rhadama*.

*Junonia rhadama*, Boisduval, Faune Ent. de Madag. p. 44, pl. vii. fig. 2 (1833).

Madagascar, Mauritius, Rodriguez, Johanna. B. M.

In the dry phase, as usual, the markings of the under surface are confused, the white markings being suffused with grey, the white central band of the secondaries replaced by a yellow one, and the ocelli indistinct and reduced in size.

68. *Precis touhilimasa*.

*Junonia touhilimasa*, Vieillot, Ann. Soc. Ent. France, lxi. Bull. p. 148 (1892).

*Junonia pavonina*, Butler, P. Z. S. 1895, p. 257, pl. xvi. figs. 1-3.

Fwambo, and between Tanganyika and Nyasa. B. M.

*J. touhilimasa* is the wet phase answering to my fig. 3; figs. 1 and 2 are the dry phase.

69. *Precis artaxia*.

*Junonia artaxia*, Hewitson, Exot. Butt. iii., *Jun.* pl. i. fig. 6 (1864).

*Precis Nachtigalli*, Dewitz, Nov. Act. Acad. Nat. Cur. xli. 2, p. 194, pl. xxv. fig. 16 (1879).

Mashonaland, Portuguese E. Africa, Nyasa, Fwambo. B. M.

The seasonal phases of this species differ much as in *P. touhilimasa*; *P. artaxia* is the dry phase and *P. Nachtigalli* the wet. In all collections obtained during both wet and dry seasons we have received both forms.

70. *Precis almana*.

*Papilio almana*, Linnæus, Mus. Lud. Ulr. p. 272 (1764).

*Papilio asterie*, Linnæus, Syst. Nat. i. 2, p. 769 (1767).

*Junonia nikobariensis*, Felder, Verh. zool.-bot. Ges. Wien, xii. p. 482 (1862).

*Junonia javana*, Felder, l. c. p. 487 (1862).

*Junonia sumbae*, Doherty, J. A. S. B. ix. p. 172 (1891).

India, Ceylon, Andamans, Mergui, Pegu, Burma, Siam, Malacca, Penang, Sumatra, Java, Philippines, Formosa, China, Celebes.

As is now well known, *P. asterie* is the wet phase and *P. almana* the dry; the intermediate phase retains the outline of the wet, but the under-surface colouring approaches



that of the dry phase; nevertheless all intermediate examples are not absolutely constant, some showing more falcation of the primaries than others. The local variations are not constant enough to deserve names, but examples from Western China tend to have smoky secondaries; and an example which we have from the Celebes is of a smoky ochraceous tint over the whole upper surface; examples from Java are usually rather small, but not smaller than many other examples of the species. The characters upon which the var. *sumbæ* is separated are extremely variable: the upper ocellus of the primaries is sometimes almost lost in the black bar from costa, and the lower ocellus partly enclosed in a black patch in Indian examples; the lower ocellus in the secondaries is sometimes quite large, at others almost obliterated; the uppermost ocellus on the under surface of primaries is sometimes well-formed, with defined pupil, sometimes reduced to a fine point; the upper pair on the secondaries exhibits great variation as regards separation, and the lines on the under surface are frequently almost entirely red-brown instead of black; the pale bands on the under surface also vary in number, the wettest phase showing them most distinctly.

XXX.—*Notes from the Gatty Marine Laboratory, St. Andrews.*—No. XXI. By Prof. M'INTOSH, M.D., LL.D., F.R.S., &c.

[Plate I.]

1. On some Points in the Life-history of the Littoral Fishes.
2. On Japanese Annelids—*Nephtys* and *Eteone*.
3. On Norwegian Annelids collected by Canon Norman.
4. On Canadian *Phyllodoce* collected by Mr. Whiteaves.
5. On certain *Hesionidæ* from the 'Porcupine' Expedition of 1870.

1. *On some Points in the Life-history of the Littoral Fishes*\*.

No group of marine fishes is better fitted for demonstrating the great mortality which ensues between the period of the deposition of the ova and the adult condition than the littoral fishes, such as the Shanny, Cottus, Gunnel, and Viviparous Blenny. This is especially true of such a form as the Shanny, the adults of which can, as a rule, be readily located on rocky shores in the pools between tide-marks.

\* Communicated to the Bradford Meeting of the British Association, 1900.

Not unfrequently only a single Shanny is encountered in a pool, its presence being disclosed by the noise as it leaps from the seaweeds on which it has been lying into the water. Yet the adult females deposit a considerable number of eggs in small rocky caverns, and the young abound in the rock-pools in August and September, when they are still more or less pelagic. As they increase in size they become fewer—not so much by spreading themselves in the ocean or by taking advantage of new sites amongst the rocks, but apparently by steady diminution from predatory neighbours. Thus it is that large adults are comparatively rare at St. Andrews.

The eggs of the Shanny would not seem to suffer so seriously from the attacks of birds, rats, and predatory fishes as those of the Short-spined Cottus and the Lumpsucker, nor are the adults much, if at all, molested by man, yet the drain on the young and adolescent forms suffices to restrict the numbers.

The Viviparous Blenny is by no means plentiful in its adult condition between tide-marks, even in winter, though it cannot be said to be rare. Its distribution at St. Andrews, for instance, is similar to what it was fifty years ago, and perhaps for a very much longer period; yet its young, so far as observed, do not leave the tidal region, though the adults may occasionally be seen following the flowing tide at low-water mark. It has also to be mentioned that in spring and summer the adults are rare between tide-marks, probably having gone to estuarine and laminarian regions to recruit. They are more frequently met with in the rock-pools from November to January. Yet the adults are to be found in the harbour throughout the summer; they appear to take to the rock-pools in connection with the discharge of their young. The viviparous habit affords a contrast both with those having demersal and those having pelagic eggs. The young, further, reach an advanced stage of growth (about two inches) before leaving the parent, and thus commence life under favourable auspices; yet the attacks made on them by pelagic and littoral fishes, and even by their own parents, suffice to keep the species in check, so that though an adult female may produce from 40 to 70 or more young in a form capable of taking care of themselves, and at once sheltering under stones, sticks, crabs, shells, and similar structures, yet the losses ere they reach the adult condition are great—and this without any interference in our country by man.

The Short-spined Cottus (*Cottus scorpius*) shows the same abundance of demersal eggs and even greater numbers of

pelagic young, yet the adults are by no means plentiful in rock-pools or in the laminarian region. The eggs are a favourite food of many fishes and some birds, so that destruction begins early in the life-history. The larval and post-larval forms are pelagic and may be caught at the surface in inshore water, for their range at this stage appears to be greater than that of the Shanny, just as the range of the adult extends beyond the tidal region into the neighbouring sea. Their gaudy coloration and protective spines, however, do not prevent a serious reduction in their numbers, so that the contrast between the crowds of young and the comparatively few adults is noteworthy.

The eggs of the Lumpsucker, though the adult is not strictly a littoral fish, are perhaps the most conspicuous demersal eggs on our shores\*, both in regard to numbers and coloration, and they have the further interest in that they are faithfully guarded by the males. The newly hatched young are pelagic, and often swarm in the rock-pools and adjoining inshore areas, while the subsequent stages—to nearly 20 mm. in length—are also pelagic, though some of the larger are fixed by the sucker to floating pieces of seaweed (*Fuci*) and thus are captured in the tow-nets. They (the larger) can, however, swim rapidly from place to place on separation from the weeds. Their greenish tints—with remarkable touches of silvery white—and their peculiar papillæ do not seem to prevent a great reduction in numbers from this stage onwards, chiefly by the attacks of predatory fishes. The adults are certainly comparatively few in contrast with the masses of ova and the swarms of post-larval specimens, though from their frequenting the region beyond low-water mark there is less opportunity for observation than in the case of the Shanny. Besides, seals are fond of the adults and many of the males fall victims to their faithful guardianship of the eggs. While this species is in greater numbers than such as the Shanny, its habits and its size prove fatal, for it is caught in considerable masses in the salmon bag-nets off rocky coasts, and in former times was used to feed the pigs of the fishermen. The adults are also occasionally caught on hooks 20–30 miles from land.

The Gunnels deposit their eggs in masses about the size of a walnut between tide-marks, and the parents watch them during incubation. A large number of hardy larval fishes are produced, and during a considerable portion of their early growth (larval and post-larval) they are pelagic and often

\* They were produced to the Royal Commission on Trawling, in 1883, as the eggs of the haddock.

occur in great numbers at a distance from the tidal region. The adolescents, again, have been met with at considerable depths. The adults, on the other hand, are found under *Fuci* in tidal rivulets and under stones between tide-marks. Though common, they never form groups, but occur singly or in pairs, and their numbers (in contrast with those of the young) are insignificant. The large number and hardy nature of the latter indicate that a great increase would annually take place if their ranks were not seriously thinned during growth. The migration of the young seawards probably increases the chances of survival, though some might consider that such augments the danger. Much depends, however, upon the eagerness with which the early stages are pursued by littoral, laminarian, or pelagic fishes.

Fifteen-spined Sticklebacks are by no means numerous between tide-marks, though at the same time they are generally distributed. They occur in rock-pools (especially those approaching high-water mark), where they make their nests. Their eggs are not so numerous as in the foregoing forms, but they are thus specially protected. The young are plentiful in the rock-pools in June and present hundreds for every adult along the coast-line. As the young seem to keep to the rock-pools during growth, it is in the tidal region that the decrease in their numbers takes place, and it may be that great mortality ensues before the spines are fully developed, though much weight need not be attached to this feature. Both littoral and pelagic fishes, and, in their early stages, Mysidæ and other crustaceans, have them for prey. The result is that their ranks dwindle to a few adults here and there in the rock-pools of a region, their protective spines and hard surface having failed to do more for their preservation.

The next species, the Five-bearded Rockling, belongs to a different category, since its eggs are numerous and pelagic. The adults occur sparingly between tide-marks in rock-pools, and seldom seek the adjoining area seawards. The pelagic eggs tend to scatter the species widely, and the larval and post-larval stages follow the same pelagic habit. The young are familiar as silvery mackerel-midges in the surface tow-nets all round our shores. Thus the eggs and young may wander far from the place of their nativity and spread the species on new sites; yet neither the large number and transparency of the former nor the wide distribution of the latter enables the species to increase beyond a certain specified limit, and this though there is no interference by man. The contrast between the life-history of this form and



that of such members of the same family as the cod, haddock, whiting, and ling, is sufficiently pronounced, for in the one case the species is limited, even though the eggs are everywhere found in the tow-nets, whereas in the others the numbers are immense, and this notwithstanding all the efforts of man to destroy them.

A consideration of all the foregoing forms shows that the numbers of the adults do not, as a rule, vary much from period to period, and that the large number of eggs—whether demersal or pelagic—and of young are necessary to maintain the species, and this though there is no systematic capture of any of them either for food or for pleasure. Moreover, the incursions or migrations of the young into the neighbouring waters in their pelagic condition probably play an important part in the preservation of the species, yet there is considerable variety in the methods by which this is carried out.

Further, if such uniformity and persistence characterize littoral fishes everywhere within the easy access of man, it is not a great step to the view which holds that the marine food-fishes are in no great danger of extinction by the operations of man. These fishes have a vast area of water which is utilized not only for the migrations of the adults but for the spread of the pelagic eggs, larvæ, post-larval forms, and adolescents. Even were the inshore flat-fishes, for instance, to be reduced to such a degree that their capture would no longer be profitable, that fact would be their safeguard, for they would be left, amidst the most favourable surroundings, to augment their decimated ranks.

## 2. *On Japanese Annelids—Nephthys and Eteone.*

### *Nephthys Jeffreysii.*

A single example of a small *Nephthys* was dredged in 30 fathoms by Capt. St. John in the Japanese area  $33^{\circ} 58' N.$ ,  $130^{\circ} 27' E.$ , and sent to me in 1874 by Dr. Gwyn Jeffreys.

The head is proportionally smaller than in *N. longisetosa*, Örst., to which the species is allied, and forms a somewhat hexagonal lozenge, with a pair of small though very distinct black eyes at the posterior border, which, like the anterior, forms the narrow sides of the hexagon. The anterior tentacles are subulate and curve forward. The posterior pair, of a similar shape, follow closely. The proboscis is of considerable length, has somewhat longer papillæ than in *N. longisetosa*, in 22 rows (instead of 15 in the species mentioned) and 6 or 7 in each row. They increase in length from the proximal to the distal series and have a backward

curve. The usual series of bifid papillæ occur on the distal margin (in extrusion).

The body has the typical shape. The posterior region is absent. The bristles resemble those of *N. longisetosa* in their curvature and strength, but the two annelids are readily discriminated by the reduction of the dorsal lamella in the Japanese form.

In the typical foot the dorsal lamella has a stiff conical outline (Pl. I. fig. 1), standing nearly erect instead of having the backward slope of that in *N. longisetosa*, and it is directed outward and slightly upward. The dorsal cirrus is a slender subulate process with an enlarged base, and is connate with the base of the branchia. The latter is somewhat slender, and is curved inwards, as in *N. longisetosa*. The capillary dorsal bristles are pale, strong, and curved backward from a limited origin below and in front of the lamella. The spine is indistinct, but pierces a papilla between these bristles and the camerated anterior series. The line of origin of both sets of bristles is unusually limited. Unfortunately the bristles have lost their finer characters, but both the capillary and the camerated are stout, the segments in the latter being in many narrow.

The inferior division presents dorsally a curved, slightly tapered, branchial process, somewhat thicker than the dorsal cirrus. The tip of the lobe is bluntly conical and bevelled from above downward in lateral view—from the shape of the posterior lamella. The capillary and barred (camerated) bristles lie in front, the latter having no perceptible guard or fillet to their base anteriorly. The ventral cirrus is proportionally large, with a swollen base and tapering extremity.

In describing *Nephthys dibranchis* in the Annelids of the 'Challenger,' allusion was made to the species thus:—

"A similar species (*Nephthys Jeffreysii*) comes from Japan, lat. 33° 58' N., long. 130° 27' E., where it was dredged by Capt. St. John. The structure of the foot, however, shows a characteristic divergence. Instead of being rounded, the superior lamella has a nearly straight upper edge, the tip is pointed, and the external border convex. The superior lobe of the foot is less produced than in the foregoing, the cirrus at the base of the branchia is symmetrically dilated at the base, and thereafter forms a nearly cylindrical process. The branchial process is both shorter and more slender, and the enlargement a little beyond the base externally very prominent. The inferior lobe is very short, presenting superiorly a short, straight, branchial process which extends a little beyond the tip of the lamella beneath, which is some-

what conical. The ventral cirrus is broadly fusiform at the base, and slender distally."

*Eteone japonensis*, sp. n.

*Habitat.* Dredged in the Japan Sea by Capt. St. John in 1874 and sent by Dr. Gwyn Jeffreys.

It is a comparatively small species, apparently about an inch in length. The head forms a proportionally broad spathulate and truncate region, with two well-marked eyes situated towards the posterior region. The tentacles are of average size and subulate. The tentacular cirri are also subulate, but tapered to a fine point, and scarcely reach the diameter of the narrow body. The latter is linear elongate, very slightly tapered anteriorly, but more distinctly diminished posteriorly, where it terminates in two ovoid styles or cirri. The feet (Pl. I. fig. 2) lean to the type of *Eteone arctica*, Malmgren, but differ in the more elongated or broadly lanceolate dorsal lamellæ, which likewise have a longer pedicle. This difference is especially marked posteriorly. The setigerous process is somewhat pointed and bears a series (few in number) of slightly curved bristles that are stouter than those of *Eteone arctica*. The shortness of the dilated region at the end of the shaft and the shorter curved hooks at the tip on each side of the terminal blade are characteristic. The terminal blade is very finely tapered, and the edges so minutely denticulated that the teeth are invisible in ordinary views. The ventral lamella stands freely outward as a broadly lanceolate process, but its tip does not project beyond that of the setigerous division.

3. *On Norwegian Annelids collected by Canon Norman, D.C.L., LL.D.*—Nephtydidæ, Phyllodocidæ, and Hesionidæ.

No new species was met with in the groups under consideration, but *Nephtys hystrix*, M'I., var., was found to be common off Lervig, in Lervig Bay. In this variety the body is less firm than in *Nephtys ciliata*, O. F. M., with which species it agrees in the size of the papillæ of the proboscis, but the latter is smooth inferiorly (in extrusion) instead of being papillose. The anterior free flap of the foot is very small, and in some appears to be absent. The other forms were *Nephtys pansa*, Ehlers, *N. cirrosa*, Ehlers, *N. scolopendroides*, D. Ch. (young), *N. ciliata*, O. F. M. (the most abundant species), and a young example of *N. caeca*, Fabr.

*Nephtys pansa*, Ehlers\*, was originally described from Station 45 of the 'Porcupine' Expedition, 30th July, 1869, 51° 1' N., 11° 24' W., at a depth of 426-458 fathoms, and a bottom temperature of 8°·35 Celsius.

A specimen was procured by Canon Norman off Dröbak, Christiania Fjord, in 30-100 fathoms.

It is distinguished by its somewhat short proboscis, which has about four papillæ in each of the rows (22), and the structure of the feet. The latter present a narrow posterior lamella and a short conical dorsal cirrus, whilst the branchiæ in the anterior segments form short, flat, and broad lamellæ, but they diminish posteriorly to small processes, so that the feet approach those of *N. incisa*, Mgrn. The proboscis has no long median papilla as in *N. ciliata*. The capillary bristles are boldly curved and strongly serrated, and the barred or camerated bristles have the usual structure.

The Phyllodocidæ are represented by the generally distributed *Phyllodoce grænlandica*, Örsted, *Eumida sanguinea*, Örsted, by the less common *Notophyllum polynoides*, Örsted, *Genetyllis lutea*, Malmgren, *Eteone fucata*, Sars (?), and the rarer *Mysta barbata*, Malmgren, and *Sige fusigera*, Malmgren, the last being, indeed, a characteristically northern form.

Only two of the Hesionidæ were obtained, viz. *Ophiodromus vittatus*, Sars, and *Castalia punctata*, O. F. M., both finely coloured species, especially the former.

#### 4. On Canadian Phyllodocidæ.

The specimens were dredged by Mr. Whiteaves, now of the Geological Survey of Canada, from 1871-1873.

Besides those subsequently noted, the ubiquitous *Phyllodoce grænlandica*, Örsted, was most abundant, large specimens occurring 15 miles S.S.E. of Bonaventure Island and on Bradelle Bank. There were also a form near *Phyllodoce laminosa*, Savigny, and another species which differs both from this species and *P. grænlandica*. Three species of *Eteone* are present, viz. a form near *E. lentigera*, Malmgren, *Eteone spetsbergensis*, Mgrn., and another which approaches the *E. cinerea*, of Webster and Benedict. One specimen of *E. spetsbergensis*, from Bradelle Bank, had, about the 52nd foot on the left, an elongate-ovoid white crustacean parasite fixed firmly in the sulcus between two feet. The flask-shaped body is smooth, but dorsally (in regard to the annelid) a transversely elongated brownish area occurs, and internally

\* Zeitsch. f. w. Zool. Bd. xxv. p. 40, pl. iii. figs. 1 & 2.



opaque whitish granules extend distally from it. The thick end of the elongated pear-shaped parasite narrows to a chitinous proboscis, which is deeply inserted in the tissues of its host.

*Phyllodoce* sp.?

*Habitat.* Dredged in Gaspé Bay, Canada, 30 fathoms, 1873, by Mr. Whiteaves.

*Head* (in spirit) forming a blunt cone, with the four short subulate tentacles at the tip. The posterior margin of the head is cordate, with two lateral bosses. The eyes are of good size, though much smaller than those of *P. oculata*, Ehlers\*, and are situated about the posterior third of the head and have lateral as well as dorsal vision. The tentacular cirri are of average length, the anterior dorsal arising just outside the lateral boss.

*Body.* As only a fragment of the anterior region was procured, all that can be said is that the general structure is typical, the segments being boldly marked dorsally and ventrally, two transverse bars in each segment being present, and ventrally a median longitudinal groove.

The foot (Pl. I. fig. 3) is characterized dorsally by a broad and somewhat irregular lanceolate lamella, which probably is considerably altered posteriorly. The setigerous region is slightly bifid, and bears a series of pale bristles, with the usual curve distally below the dilated end of the shaft, which is spinous along the edge and more minutely so on the surface. The terminal blade is long, finely tapered at the tip, and rather boldly serrated on the edge.

The ventral lamella is irregularly lanceolate, with a pointed tip, which extends fully as far outward as the tip of the setigerous process.

This species differs from *Phyllodoce laminosa* in the shape of the dorsal lamellæ, for they are much less foliaceous anteriorly, and the ventral lamellæ do not project so much beyond the setigerous region.

The tips of the bristles are also longer and more tapered, and in this respect they also differ from the *P. fragilis* of Webster†.

It is no nearer *P. grænlandica* or other form. It differs from the *P. oculata* of Ehlers, also from the American waters, which has a dorsal lamella of similar shape anteriorly and spinose dilated ends to the shafts of the bristles, by the broader and shorter ventral lamellæ.

\* Florida-Anneliden, p. 135, Taf. 40. ff. 4-6.

† Annelida Virgin. Coast, p. 14, pl. iii. figs. 32-37.

The proboscis seems to approach that of *P. grænlandica*, having apparently (as the specimen is injured) 17 terminal papillæ, and similar rows of these organs at the base.

The exact relationships of the American Phyllodocidæ to the European forms have yet to be more rigidly determined. Further, more accurate figures of the bristles and other parts are required. I have been unable to follow the distinctive characters of such as *P. catenula*, Verrill, for instance, as certain parts have been omitted. It is possible that the present form comes close to the latter.

*Eteone lentigera*, Malmgren?

*Habitat.* Dredged at 30 fathoms in Gaspé Bay, St. Lawrence, Canada, 1873, by Mr. Whiteaves.

*Head* bluntly conical, the transverse exceeding the antero-posterior diameter, and with a short tentacle on each side of the rounded snout. The second tentacle is shorter, and is only visible in lateral and ventral views. A median triangular region of the head is cut off by a line from the constriction behind the dorsal tentacles to the centre of the posterior border of the head, a lateral area with a rounded external border being thus separated on each side. The tentacular cirri are short subulate organs, not more prominent than the feet. No eyes are present.

*Body*, to judge from the fragment, approaching three inches in length, very slightly tapered anteriorly, and having the usual shape. A prominent papilla guards each side of the mouth posteriorly. When the body is viewed laterally the setigerous process of the foot is anterior, the dorsal and ventral lamellæ sloping backward, except in the anterior segments.

The proboscis in extrusion is smooth at the base, clavate and rugose distally, while within the ring of smaller papillæ at the tip a much larger papilla projects from each side anteriorly, simulating teeth.

The rounded dorsal lamellæ are nearly vertical in front, but posteriorly somewhat overlap. The dorsal lamella forms a rounded fan anteriorly, then the edge becomes more prominent and the symmetry of the fan less perfect. The pedicle is also longer. The setigerous lobe is somewhat short and massive, blunt and bifid at the tip. The shafts of the bristles are slender; the dilatation at the tip has a distinct shoulder, is obliquely striated, and presents two short stout terminal hooks or spines, which, when the blade is viewed in profile, are lateral in position and next the serrated edge of the blade. Secondary small spines are visible on the

ridges in some examples. The terminal process is obliquely striated, of moderate length, serrated on the edge, and finely tapered.

The ventral lamella is bluntly rounded at the tip in front and broadly ovate. It projects considerably beyond the setigerous region both in the anterior and posterior feet, but it is narrower and more pointed externally.

A specimen had thrust itself into the tube of *Chætopterus*.

Unfortunately Prof. Verrill does not mention the condition of the proboscis or the ventral lamellæ in his species\*. Accordingly his *Eteone robusta*, *E. limicola*, and *E. setosa* cannot be accurately identified.

#### *Eteone cinerea*, Webster & Benedict?

*Habitat.* Dredged by Mr. Whiteaves between Bradelle Bank and Miscou Island, in 45 fathoms, Gulf of St. Lawrence, Canada.

*Head* forming an obtuse cone, brownish, and without visible eyes. The tentacles are short. The subulate tentacular cirri are a little longer than the feet, and about four seem to be present on each side, thus differing from the typical *Eteone*.

Body incomplete, about three-quarters of an inch of the anterior region being present. It is tinted brownish in front, pale posteriorly. The aspect from the dorsum is peculiar, since the elongated dorsal lamellæ trend backwards as isolated processes.

The 30th foot (Pl. I. fig. 4) has dorsally a lobe which, at the 10th foot, is ovato-lanceolate, and although the pedicle is short it extends far outward and upward from the setigerous process. It increases in size posteriorly, and the pedicle becomes more distinct, the lamella forming an elongate ovoid, slightly narrowed at the tip, yet presenting a more or less clavate aspect in certain views. In form the dorsal lamella somewhat resembles that of Ehlers's *Eteone sculpta*† from South Georgia, but in this case it is considerably longer, and there are other differences in the structure of the feet. The setigerous process is short and bifid. The shafts of the pale slender bristles have an elongated or somewhat fusiform dilatation at the tip, and the spines at the end are delicate and translucent, but have a similar arrangement to that of *Eteone*. The dilatation is very minutely spinulose. The

\* Invertebr. of Vineyard Sound, &c., Rep. U.S. Comm. Fish & Fisheries, 1873, p. 588.

† Hamburger Magalhaens. Sammelreise, Polychæt. p. 33, Taf. 1. fig. 32 (1897).

terminal blade is translucent, tapers to an extremely fine point, and the serrations on the edge are minute. The entire bristle is perhaps one of the most delicate in the group.

The ventral lamella is ovoid and bluntly rounded in front, more pointed posteriorly. It projects considerably beyond the setigerous region.

The *Eteone limicola* of Verrill \*, is described as having "lateral appendages small on the anterior segments, becoming much more prominent farther back; anterior branchiæ very small, ovate, sessile; those farther back much longer, and narrow ovate"; but in the Canadian form the dorsal lamellæ extend prominently outward and upward, even so far forward as the tenth foot. The eyes also appear to differ, none being visible in the present species. The form approaches Webster and Benedict's *E. cinerea* †, though the ventral lamella in the Canadian species extends considerably beyond the setigerous region, whereas in the American author's figure it falls short of it.

5. *On certain Hesionidæ from the 'Porcupine'  
Expedition of 1870.*

*Tyrrhena atlantica*, Roule ‡.

*Habitat.* Several specimens were dredged in the 'Porcupine' expedition of 1870 at Station 9, on the Channel Slope, lat. 48° 6' N., long. 9° 18' W., in 539 fathoms, on a bottom of grey mud. Bottom temperature 48°·0 Fahr., surface temperature 64°·0.

*Head* more or less quadrate, with the long diameter antero-posterior, and generally with a median depression and a somewhat cordate posterior border, so that the eyes occur on an elevated ridge on each side. The anterior pair of eyes are wide apart, large, rounded, and with a cuticular lens in the centre, the darkest part of the pigment-ring, in spirit, being the inner and posterior border. The posterior pair are rounded or oblique in the preparations. The two pairs lie in the middle of the head. From the outer and inferior angle of the head on each side the palpi project forward and downward, the segment at the tip being proportionally short, and, in his species, Claparède observes that it can be partly invaginated. The organ is of considerable thickness at the

\* Invert. Vineyard Sound, &c., Rep. U.S. Comm. Fish & Fisheries, 1873, p. 588.

† Annelids of Provincetown, Rep. U.S. Comm. Fish & Fisheries.

‡ "Campagne du 'Caudan,'" Ann. de Université de Lyon, Août-Sept., 1895, p. 455, pls. xxi., xxiv., xxv. figs. 9, 10, 24, 28, 29 (1896).



base, and tapers towards the tip. The tentacle, which is internal and superior to the former, is subulate and much more slender. It springs from the front of the head at the inner edge of the former and is longer. In the median line between the posterior pair of eyes is a comparatively short subulate median tentacle, which is easily overlooked, especially in an indifferent preparation. The edge of the proboscis projects in the preparations, and in the median line dorsally is a prominent papilla, which lies under the anterior border of the snout, and Claparède states that in life, in his form, it is surrounded by a circle of cilia. In these preparations the eyes are considerably larger than in examples of *T. Claparèdii* from Naples, and the tentacular cirri larger and longer.

*Body* about  $1\frac{1}{2}$  in. long, massive anteriorly, though in life it tapers a little towards the head, as Delle Chiaje and Claparède show in *T. Claparèdii*, and more distinctly towards the tail. It is rounded or convex dorsally, iridescent and minutely ringed, somewhat flattened ventrally, and with a deep median groove. The tail terminates in a free median vent, with a long cirrus at each side. The tentacular cirri are 8 in number on each side, and are long tapering organs springing from a massive basal segment, which is furnished internally with spines. The first four segments are fused, but, as Claparède showed in his species, they receive special nerve-twigs, and thus he thinks the view of De Quatrefages that all the cirri arise from the buccal segment is untenable. The proboscis *in situ* presents a somewhat thick, frilled, anterior edge, the blunt papilla alluded to projecting from the central fold of the dorsal arch. As Claparède pointed out in *T. Claparèdii*, chitinous jaws are situated in the present species at the anterior end of the organ *in situ* in the mid-dorsal and mid-ventral lines. The dorsal teeth at the free edge have the shape of a bifid fan, whilst the ventral resembles a conical tooth. The massive wall of the organ becomes more chitinous and of a brownish hue, and (extending backward quite a third of the length of the body) terminates at a prominent aperture (the gut) in the centre of its posterior wall. Two flattened lateral cæca, also with dark pigment, occur in this region. The inner surface of the proboscis has two thick pads behind the teeth in front, a transverse bar on each side in the middle, and the posterior half is subdivided by deep grooves. It seems to be an efficient prehensile and suctional organ, and its great proportional size probably renders its function important.

The bristled feet (Pl. I. fig. 5) are 16 in number, long and

prominent, and their resplendent tufts of bristles make them still further conspicuous. The dorsal lobe presents just behind the ridge of the foot the basal segment of the dorsal cirrus, while the setigerous region in front is acutely conical, the long black spine passing to the apex. Each bears a tuft of simple and somewhat stiff bristles, which taper gently to a hair-like tip. The whole bristle is marked by transverse striæ or camerated till within a short distance of the tip. Moreover, the tip is furnished with a regular series of minute spikes. The latter are much more conspicuously developed in *T. Claparèdii* from Naples, the spikes in some being continued far downward, and forming a feature along each side of the bristle. It was the comparison between the dorsal bristles of the two forms that many years ago led to their separation. Claparède had overlooked the presence of these spikes in his species, as also has Roule in the present form. The ventral division is irregularly conical, with a prominent papilla for the powerful black spine or two. The upper slope of the region is downward and outward, the inferior (more abrupt) is downward and inward. In shape the foot thus differs from that of *T. Claparèdii* from Naples, which is longer, and the inferior setigerous region has an abrupt truncated extremity with, superiorly, a papilla for the spine. The base of the dorsal cirrus is carried erect in the specimens from the 'Porcupine,' whereas it is horizontal in *T. Claparèdii*, but this is not of much moment. The bristles (Pl. I. fig. 6) form a dense tuft. The shaft has a close series of longitudinal and transverse striæ, is slightly dilated at the distal end, and then bevelled—from the attachment of the terminal process to the point. The distal blades are longest towards the upper third of the tuft, shorter dorsally, and shortest ventrally. Each is flattened, slightly tapered, and curved distally, where it is bifid, with a secondary process beneath. Oblique striæ slope from the serrated edge of the blade downward and backward. The bevelled base of the blade is attached by a web to the shaft. These bristles, though pale, are finely iridescent, and in some are brownish in the posterior region of the body.

In comparing these bristles with those of *T. Claparèdii* from Naples the whole bristle is more slender, the tips longer and more delicate, and the bifid forked tip more minute (Pl. I. figs. 7 & 8). The boldly bifid nature of the tip in *T. Claparèdii* (fig. 7) and the more distinct secondary process are in contrast with fig. 8 (*T. atlantica*), the second or inferior spur being curved and the secondary process adpressed. The serrations on the edge of the blade are similar. The backward tilt of the tip of the bristle is seen in both, but

*T. atlantica* has also a tendency to a dorsal curve (*i. e.* a convexity towards the dorsal edge) throughout. It is the same type of bristle in both, but that from the abyssal species has been modified. The type of bristle is that of *Dalhousia atlantica* of the 'Challenger' \*.

The ventral cirrus is of considerable length, slender, subulate, and tapering. It extends a little beyond the fleshy part of the foot.

Claparède in his species found the male elements developing in winter.

The genus *Tyrrhena* was established by Claparède † for a species first discriminated under the name of *Costalia Claparèdii* in the manuscript of the fourth 'Annuaire du Musée Zoologique de Naples,' by Achille Costa. He characterized the genus (named after the sea it inhabited) as having few segments; the head-lobe provided with five antennæ (two palpi and three tentacles); dorsal division of the foot with capillary bristles, ventral with compound bristles; 8 tentacular cirri; and the proboscis with two maxillæ.

What relationship Claparède's or the present species has to the various forms described or alluded to by De Quatrefages ‡ is uncertain, for there is little that is definite or that can be relied on in his treatment of the Hesionidæ, as, indeed, Claparède long ago pointed out. In the number of the tentacular cirri *Tyrrhena* agrees with the genus *Fallacia* of De Quatrefages, but this is all that can be said with safety.

Though the species had long been discriminated in my collection, the publication of the Annelids of the 'Caudan' by Prof. Louis Roule gives his title priority. His single example was procured in the Atlantic at a depth of 1410 mètres. In his description no allusion is made to the cuticular lens of the anterior eye. He correctly points out the distinctions from *Tyrrhena Claparèdii* in regard to the tentacular cirri and the teeth. His account of the dorsal bristles, however, requires further elucidation, for he states that they are of two kinds, viz., a rare form, which is simple and delicate, tapering to a curved point; the other the camerated bristle, which at its tip has a cap of granular matter, giving it the aspect of a racquet. In that from the 'Porcupine' not a few of the dorsal bristles had a granular parasitic mass near the tip, as, indeed, is liable to happen in spiked bristles. That the type of bristle should be so altered (as shown in Prof. Roule's right

\* Annelids of the 'Challenger,' p. 186, pl. xv. a. figs. 5-7.

† Ann. Chét. Nap. p. 227.

‡ Annelés, pp. 95-111.

figure in fig. 29, pl. xxv.) is remarkable. He has likewise omitted to record the presence of the spikes. His artist has, further, taken considerable liberties in his drawing of the ventral bristles (pl. xxv. fig. 28), but perhaps the style of plate adopted is unsuitable for the illustration of structures so delicate and yet so characteristic. The distal segment of the palpus is also overlooked in pl. xxi. fig. 10 and the sub-frontal papilla is tapered to a point, whereas that in the specimens from the 'Porcupine' was blunt.

*Dalhousiella Carpenteri*, sp. n.\*

*Habitat.* A single example was dredged in the 'Porcupine' expedition of 1870 at station 9, on the Channel Slope, lat. 48° 06' N., long. 9° 18' W., in 539 fathoms, on a bottom of grey mud. Bottom temperature 48°·0; surface temperature 64°·0 Fahr. This species accompanied *Tyrrhena atlantica*, which, like *Ophiodromus* and other Hesionidæ, has a fondness for mud—often of a most tenacious description.

*Head* (Pl. I. fig. 9) agrees with the type seen in *Dalhousia* and, though there is no median tentacle, in *Tyrrhena*. The tentacles appear to be about the length of the palpi, which have a short terminal segment. A deep median furrow separates the rounded lobes on which the large and closely approximated eyes are situated. The preparation shows less disproportion between the anterior and posterior eyes than usual, but it is not good. There are eight pairs of tentacular cirri, with spines, in the buccal and following segments, and they appear to have long and slightly moniliform tips as in allied forms.

*Body* of the typical form, about  $1\frac{1}{4}$  in. long (in spirit), and with 17 bristled segments. The posterior end appears to be injured, though two short cirri occur beneath the vent. The papilla beneath the snout is small (or little elevated).

The proboscis has a firm wall and a glistening interior surface, but, though the parts are dense in the mid-dorsal line, no distinct teeth are present.

*Feet.* In the state of the preparation the shape of these is uncertain, but they are long and appear to diminish more towards the outer edge than in *Tyrrhena*. The dorsal cirrus arises somewhat behind the ridge of the foot, has two very

\* The genus thus provisionally established agrees with *Hesione* in its uniramous foot, but differs in the structure of the bristles and in the number of the tentacular cirri. It is named after the late Secretary for Scotland, who took so masterly a grasp of the Scottish Fisheries. The specific name is after the late Dr. B.W. Carpenter, who occupied so prominent a part in the 'Porcupine' expeditions.



small black spines at its base, and is long, tapering, and slightly moniliform. No dorsal bristles were visible in the preparation.

The setigerous region tapers towards the outer extremity, where a papilla occurs. The spine is black and powerful. The bristles (Pl. I. fig. 10) have comparatively short shafts, which are minutely striated longitudinally and transversely as in allied forms. When seen on edge the tips of the shafts are somewhat fusiform, from the dilatation below the bevelled region. In lateral view, though the diameter is greater, the dilatation is less pronounced and the striæ are now oblique. The terminal blade is comparatively short, has a web connecting its bevelled base with the shaft, is slightly curved, and tapers very little to the strongly forked (longitudinally split) terminal region. The dorsal limb of the fork, viz. that opposite the serrated edge, is the longer, but is frequently broken. It is proportionally longer in the upper bristles of the tuft. The edge of the blade is minutely spinous even up to the base of the fork. The ventral cirrus is slender and subulate, stretching beyond the fleshy tip of the setigerous process. The structure of this bristle would seem to be diagnostic, for though that of *Stephania flexuosa* of Delle Chiaje \*, as figured by Claparède †, is a step in its direction, yet not even uniform and continuous friction could make it resemble that of the present form, and this without referring to other distinctive characters of the species.

#### EXPLANATION OF PLATE I.

- Fig.* 1. Anterior foot of *Nephtys Jeffreysii*. × about 90 diam.  
*Fig.* 2. Anterior foot of *Eteone japonensis*. × 90 diam.  
*Fig.* 3. Anterior foot of *Phyllodoce* sp. ? from Gaspé Bay. × 79 diam.  
*Fig.* 4. Thirtieth foot of *Eteone cinerea*, Web. & Bened. × 250 diam.  
*Fig.* 5. Foot of *Tyrrhena atlantica*, Roule, viewed from the front. × 12 diam.  
*Fig.* 6. Bristle (with very short tip) of the foregoing. × about 100 diam.  
*Fig.* 7. Tip of a bristle of a specimen of *Tyrrhena Claparèdii* from Naples. × about 400 diam.  
*Fig.* 8. Tip of a bristle from *Tyrrhena atlantica* procured by the 'Porcupine.' × about 400 diam.  
*Fig.* 9. Head of *Dalhousiella Carpenteri*, enlarged under a lens. The specimen was indifferent.  
*Fig.* 10. Distal blade and tip of the shaft of a bristle of the foregoing. × about 400 diam.

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\* Mem. sugli Anim. senza Vert. ii. pp. 368, 401, & 424, tav. xix. fig. 8; Descrizione e Not. iii. p. 97, v. p. 103, tav. cxxix. fig. 8.

† Supplem. Ann. Nap. 1870, p. 118, pl. xii. fig. 1.

XXXI.—*Notes and Descriptions relating to some Plataspinæ and Graphosominæ (Rhynchota).* By W. L. DISTANT.

THE British Museum having recently acquired the very fine and extensive collection of *Plataspinæ* amassed and studied by Dr. A. L. Montandon, it has become possible—particularly in so vast a genus as *Coptosoma*—not only to identify many obscure species but to describe some new ones. It has naturally also become necessary to add a few synonymical notes.

A study of the *Graphosominæ*, the result of some recently arrived material from the Oriental region, has also added to the described species and genera.

## RHYNCHOTA.

Fam. *Pentatomidæ*.Subfam. *PLATASPINÆ*.*CODRONCHUS*, gen. nov.

Somewhat broad and moderately convex. Head large, angulate, the central lobe very broad and ovate, a little shorter than the lateral lobes, which are divergent and do not meet in front, lateral margins moderately concave from base to about the region of the insertion of the antennæ and then oblique and reflexed to apex; eyes prominent, ocelli nearer to each other than to the eyes; pronotum with the lateral margins convex, the anterior margin much excavated, nearly straight at the extreme base of head, the disk prominently transversely impressed; scutellum broad, not quite reaching the apex of the abdomen, its apex slightly concave; stigmata near the abdominal margin; rostrum reaching the intermediate coxæ; antennæ five-jointed; a raised centrally hollowed and marginally ridged process between the intermediate and posterior coxæ.

Allied to *Cratoplatys* and *Heterocrates*.

*Codronchus andamanensis*, sp. n.

Black, very thickly punctate; eyes ochraceous; rostrum brownish ochraceous; femora more or less castaneous. Head with an undulating transverse ridge between the eyes and with a short waved basal ridge; pronotum with a patch or transverse striæ at centre of anterior margin, and with a

broad central transverse impression on disk, the lateral margins convex and somewhat foliate; pronotum and scutellum with a faint central longitudinal ridge. Antennæ piceous, second joint shortest.

Long. 8 millim.; max. lat. 5 millim.

*Hab.* Andaman Islands (Coll. Dist.).

### Genus PONSILA, Stål.

#### *Ponsila montana*, sp. n.

Body above shining black; head in front of eyes, eyes, lateral margins and an oblique line joining subanterior margin of pronotum, lateral and posterior margins of scutellum and a small spot near each basal angle, head beneath, antennæ, lateral margins of sternum, rostrum, and legs ochraceous; sternum piceous, opaque; abdomen mutilated; fourth and fifth joints of antennæ piceous.

Head with the anterior area transverse, concavely excavated, the anterior angles obtusely prominent, the central lobe and anterior and lateral margins piceous; pronotum and scutellum thickly and finely punctate; pronotum with a somewhat obscure transverse impression on anterior area.

Long.  $5\frac{1}{2}$  millim.; max. lat. 5 millim.

*Hab.* Assam: Naga Hills (*Doherty*).

### VIGETUS, gen. nov.

Body broad, convex above. Head broad, short, deeply inserted in the pronotum, concave from between the region of the eyes, on the inner margin of which is a short distinct transverse ridge; anterior margin very slightly rounded; the lobes about equal in length, or central lobe slightly shortest; eyes moderately transverse. Pronotum convex, the anterior lateral margins convexly rounded and moderately laminately produced, the lateral angles distinctly nodulose; anterior margin concavely excavated for the reception of the head, posterior margin nearly straight. Scutellum broad above, completely covering the abdomen, its apex distinctly concavely excavated in the male. Rostrum apparently reaching the intermediate coxæ; antennæ with the second joint very short; odoriferous apertures very broad and obliquely striate.

A genus allied to *Madegaschia*, Montand., from which it differs by the much shorter head, the distinct nodulose lateral pronotal angles, &c.

*Vigetus typicus*, sp. n.

Above shining olivaceous black; thickly, finely, but obscurely punctate; eyes luteous; base of lateral margin to corium ochraceous; head beneath and sternum black, opaque; abdomen shining black; legs piceous, apices of femora, tibiæ, and tarsi brownish ochraceous; lateral margins of the abdomen ochraceous, inwardly angulated. Antennæ ochraceous, fourth joint piceous—remainder mutilated.

Long. ♂ and ♀, 5 to 6 millim.; max. lat.  $4\frac{1}{2}$  to  $5\frac{1}{2}$  millim.

*Hab.* Assam: Margherita (*Doherty*).

## Genus BRACHYPLATYS, Boisd.

*Brachyplatys funebris*, sp. n.

Above black, moderately shining with a dull olivaceous hue; eyes castaneous; head beneath and sternum opaque black; abdomen beneath shining olivaceous black; central area of head beneath, extreme lateral margins of pronotum both above and beneath, extreme lateral and apical margins of scutellum and abdomen ochraceous; lateral margins of abdomen beneath ochraceous, notched internally, and containing a submarginal series of black spots; legs castaneous, the femoral apices, tibiæ, and tarsi brownish ochraceous; antennæ and rostrum brownish ochraceous. Body above thickly and finely punctate.

Long. 8 to 9 millim.; max. lat. 7 to 8 millim.

*Hab.* Assam: Sadia (*Chennell*).

Allied to *B. Burmeisteri*, Dist., from which it can be at once separated by the narrow ochraceous marginal markings to the abdomen, not ray-like fasciæ as in *B. Burmeisteri*.

## Genus TIAROCORIS, Voll.

*Tiarocoris consertus*, sp. n.

♀. Head ochraceous, the margins, margins of central lobe, an oblique line a little in front of eyes, and the basal margin piceous. Pronotum with the anterior area ochraceous, glabrous, containing two large transverse discal black spots; the anterior margin black and an inner linear series of black punctures to the dilated anterior margins; posterior area ochraceous, thickly covered with large, irregular, coarse, black punctures, the basal margin narrowly black. Scutellum ochraceous, thickly covered with very coarse black punctures; the apical margin and basal transverse circumscribed area much more sparingly punctate. Sternum piceous, opaque; abdomen shining black;



head beneath, prosternum, legs, antennæ, rostrum, abdominal margin, and two ray-like fasciæ at apex of each abdominal segment ochraceous; antennæ with the fourth and fifth joints piceous.

Long. ♀, 5 millim.; max. lat.  $4\frac{1}{2}$  millim.

*Hab.* Burma: Ruby Mines (*Doherty*).

Allied to *T. contestatus*, Montand., but at once distinguished by the punctate and not black posterior area of the pronotum, by the sparsely punctate apical margin of the scutellum, longer ray-like marginal fasciæ to the abdomen, &c.

*Tiarocoris signatus*, sp. n.

♀. Ochraceous, reticulately marked with piceous. Head ochraceous; anterior margin, margins of central lobe, and central basal margin narrowly piceous; eyes pale castaneous. Pronotum with the anterior area ochraceous, levigate, with an oblique fascia of black punctures on each anterior lateral area, and with a similar fascia obliquely extending from each lateral angle and united with a transverse fascia—centrally broken—across anterior disk; remaining area somewhat thickly reticulately marked with piceous. Scutellum thickly reticulately marked with piceous, with a distinct black arcuated spot behind the basal transverse elevation. Body beneath piceous; head beneath, prosternum, legs, rostrum, abdominal margins, and inner ray-like fasciæ ochraceous; antennæ piceous, first and second joints ochraceous.

Long. 6 millim.; max. lat. 4 millim.

*Hab.* Ceylon (*G. Lewis*).

Genus COPTOSOMA, Lap.

*Coptosoma prisca*, sp. n.

Shining black above; head with the anterior halves of the lateral lobes more or less ochraceous; pronotum with the anterior lateral margins and a marginal line near lateral angles, an irregular transverse series of markings across anterior disk, a similar oblique series on anterior lateral dilatations, and two spots on anterior margin ochraceous; scutellum with the base and lateral areas mottled with ochraceous. Body beneath black, the sternum opaque, the abdomen shining; legs, lateral margins, and a small angulated spot at the apex of each abdominal segment ochraceous; antennæ piceous.

Head broad; scutellum with basal callosity.

Long. 5 millim.; max. lat. 5 millim.

*Hab.* Assam: Margherita (*Doherty*).

Allied to *C. ramosa*, Walk., but differing by the broader head, different markings, &c.

*Coptosoma saniosa*, sp. n.

Ochraceous, somewhat thickly punctured and mottled with dark castaneous. Head with the base and margins of central lobe piceous; eyes and ocelli pale castaneous. Pronotum with the anterior third separated by a distinct transverse impression, within which are two discal angulated piceous lines; a submarginal line on anterior lateral margins and a narrow anterior submarginal line piceous; a central pale line extends through the pronotum and basal callosity of the scutellum. Body beneath black, the sternum opaque, the abdomen shining; head beneath brownish ochraceous; lateral margins of sternum and lateral prosternal dilatations, antennæ, legs, rostrum, abdominal lateral margins and a long ray-like fascia (the centre of which is black) on each segment ochraceous.

Apices of lateral lobes of head cleft, not entirely meeting in front of central lobe; scutellum with a basal transverse callosity.

Long. 5 millim.; max. lat. 5 millim.

*Hab.* Tenasserim: Myitta (*Doherty*).

In general appearance somewhat resembling *C. punctatissima*, Montand., but the structure of the head quite different.

*Coptosoma pernobilis*, sp. n.

Above pale reddish ochraceous, somewhat thickly covered with dark brown punctures. Head with the anterior margin, the central lobe, and basal fascia from inner margin of eyes black; eyes castaneous; antennæ ochraceous, fourth and fifth joints infuscated; pronotum with two short, curved, transverse, linear, black fasciæ on disk; scutellum with a small macular cluster of dark punctures on each side of basal margin and a similar spot at apex. Head beneath and sternum piceous, opaque; abdomen beneath shining black; lateral margins of sternum, legs, lateral margins and two prominent ray-like fasciæ at apex of each abdominal segment ochraceous; each of the ray-like fasciæ possesses a small black spot at base.

Long. 6 millim.; max. lat. 6 millim.

*Hab.* Assam: Margherita (*Doherty*).

*Coptosoma margheritæ*, sp. n.*Coptosoma* W.?, Dist. Ann. & Mag. Nat. Hist. (7) vol. iv. p. 216 (1899).

Differs from all the varieties of *C. W.*, Montand., in having only two small spots at the anterior margin of the pronotum and not another two behind them, the apical spots to the scutellum distinctly divided and more truncate, ochraceous markings darker, &c.

Long. 4 millim.; max. lat. 4 millim.

*Hab.* Assam: Margherita (Atkins. Coll., Brit. Mus.).

I formerly gave a description of this species, *supra*, but ascribed it with doubt to the *C. W.*, Montand. Having now been able to examine a series of specimens belonging to that species, I find that there are apparently two species and that one requires a distinctive name.

*Coptosoma nilgirensis*, sp. n.

Dull opaque ochraceous, very sparingly and irregularly punctate; head impunctate; pronotum with the anterior, lateral, and basal areas impunctate, the punctures being sparingly distributed on the disk; scutellum very sparingly punctate, a longitudinal space on each side of base impunctate.

Other characters as in *C. cribraria*, Fabr.

Long. 5 millim.; max. lat. 4 millim.

*Hab.* Nilgiri Hills (*Sir G. F. Hampson*).

## BOZIUS, gen. nov.

Body moderately convex above, subovate. Head deflexed, convexly rounded in front, the central lobe as long as the lateral lobes but not elevated, a distinct transverse impression in front of eyes; antennæ moderately robust, second joint minute; pronotum long, anterior margin concave, anterior lateral margins moderately laminately dilated, a distinct transverse impression about one third from apex; scutellum very strongly transversely impressed near base, the impression not extending to the basal angles, and with a deep foveate impression on each side of its termination; rostrum just passing the anterior coxæ; femora and tibiæ (especially the intermediate and posterior) somewhat longly hirsute; odoriferous apertures lineate, ascending; abdomen beneath pilose.

Allied to *Tropidotylus*, but differing by the non-elevated central lobe to the head, the foveately depressed scutellum, different position of the odoriferous apertures, &c.

*Bozius exsiccus*, sp. n.

Dull ochraceous, somewhat coarsely and darkly punctate; fourth and fifth joints of antennæ and some irregular markings on the scutellum (of which the most prominent are at the foveate impressions, two on anterior disk, three or four transverse spots on central lateral area, and some obscure apical spots) piceous; sternum dull greyish, opaque; abdomen piceous; head beneath, lateral margins of sternum, legs, rostrum, and obscure marginal abdominal spots dull ochraceous.

Central impression and foveæ to scutellum profound; third, fourth, and fifth joints of antennæ subequal in length, or third slightly longest.

Long. 5 millim.; max. lat. 4 millim.

*Hab.* Nilgiri Hills (*Sir G. F. Hampson*).

*Bozius respersus*, sp. n.

Above ochraceous, punctured and mottled with piceous. Head with the anterior margin, base and margins of central lobe, and basal area piceous; pronotum with two piceous transverse subfoveate spots, each containing posteriorly a small ochraceous spot immediately in front of the transverse impression, disk considerably mottled with piceous, anterior and lateral margins ochraceous, levigate; scutellum with the basal impressed space with a black central fascia and black at the foveate extremities, on the basal half the punctures somewhat appear as oblique longitudinal fasciæ, on the apical third there are some transverse series of irregularly shaped black spots. Body beneath piceous, the sternum opaque, the abdomen shining; head beneath, rostrum, lateral margins of sternum, legs, antennæ, lateral margins and an inner row of lineate marginal spots to abdomen ochraceous; fourth and fifth joints of antennæ piceous.

Long. 6 millim.; max. lat. 5 millim.

*Hab.* Nilgiri Hills (*Sir G. F. Hampson*); Utakamand (*Atkins. Coll., Brit. Mus.*).

## SYNONYMICAL NOTES.

*Cantharodes Rutherfordi*.

*Cantharodes Rutherfordi*, Dist. Ent. Month. Mag. xiv. p. 246 (1878).

*Cantharodes nubilosus*, Montand. Rev. d'Ent. 1892, p. 299.

*Coptosoma testacea*.

*Coptosoma testacea*, Walk. Cat. Het. i. p. 91 (1867).

*Coptosoma immaculatum*, Montand. Ann. Soc. Ent. Belg. xxxviii. p. 265 (1894).



*Coptosoma aspersa.**Coptosoma aspersa*, Walk. Cat. Het. i. p. 97 (1867).*Coptosoma respersum*, Bergr. Wien. ent. Zeit. xi. p. 173 (1892).

Cotypes of Dr. Bergroth's species were in the collection of Dr. Montandon.

*Coptosoma nepalensis.**Coptosoma nepalensis*, Westw. in Hope Cat. i. p. 17 (1837).*Coptosoma obrosum*, Montand. Ann. Mus. Genov. xxxiv. p. 138 (1894).*Coptosoma siamica.**Coptosoma siamica*, Walk. Cat. Het. i. p. 89. n. 39 (1867).*Coptosoma concinnula*, Walk. loc. cit. p. 94. n. 54.*Coptosoma bellula*, Walk. loc. cit. p. 56.*Coptosoma inclusa*, Walk. loc. cit. p. 95. n. 57.*Coptosoma Saundersii*, Leth. & Sev. Cat. Gén. Hémo. t. i. p. 9 (1893).*Coptosoma sphaerula* (part.), Leth. & Sev. loc. cit. p. 9; Dist. A. M. N. H. (7) iv. p. 215 (1899).*Coptosoma minima*, Atkins. J. A. S. Beng. lvii. p. 342 (1889); Kulg. Arch. f. Naturg. 1901, p. 224.*Coptosoma pygmæum*, Montand. Ann. Soc. Ent. Belg. xl. p. 120 (1896); Kulg. Arch. f. Naturg. 1901, p. 221.Var. *orbicula*, Walk.*Coptosoma orbicula*, Walk. Cat. Het. i. p. 91. n. 47 (1867).*Coptosoma blandula*, Walk. loc. cit. p. 96. n. 61.*Coptosoma pygmæum*, var. *accensitum*, Montand. Ann. Soc. Ent. Belg. xl. p. 447 (1896).

Having followed previous authorities from Dallas to Lethierry and Severin in the identification of *C. sphaerula*, Germ., I now find authentic specimens of that species in Montandon's collection. I had (*supra*) placed the rather long synonymy under Germar's species; that being removed, the earliest described form by Walker naturally now takes its place by priority. Kulgatz (*supra*) has also recently pointed out the distinctness of Germar's species.

Subfam. *GRAPHOSOMINÆ*.

## EOBANUS, gen. nov.

Allied to *Bolbocoris*, A. & S. Body convex, short, moderately gibbous above. Head with the lateral lobes a little longer and meeting in front of the central lobe, their margins reflexed. Antennæ five-jointed, second joint short and slender; fourth and fifth and apex of third joints incrassated. Pronotum with the lateral margins convex, very strongly transversely impressed on disk. Scutellum almost

as long as abdomen, deeply sinuate at base, where the corium is considerably exposed; two oblique transverse impressions near base, slightly longitudinally continued at their apices. Rostrum about reaching the intermediate coxæ; meso- and metasterna with two very distinctly raised central carinæ.

*Eobanus typicus*, sp. n.

Black, very coarsely punctate; abdomen beneath much more finely punctate; antennæ and tarsi pale brownish; antennæ with the third joint a little longest, fourth and fifth joints subequal.

Long.  $3\frac{1}{2}$  millim.; exp. pronot. angl. 2 millim.

*Hab.* Burma: Bhamo.

Genus *PODOPS*, Lap.

*Podops ceylonica*, sp. n.

Ochraceous, coarsely and darkly punctate; head, anterior area of pronotum, and a small foveate spot at each basal angle of the scutellum more or less piceous; scutellum with three small ochraceous spots at base and with two irregular longitudinal series of very dark punctures; body beneath piceous, lateral margins of metasternum and abdomen broadly ochraceous; rostrum and antennæ brownish ochraceous, the last with the apical joint piceous; legs castaneous, tibiæ (excluding bases and the apices of the anterior tibiæ) and the tarsi ochraceous.

Pronotum spined at the anterior angles, the spines more or less horizontally extended, lateral pronotal margins convex.

Long. 7 millim.; exp. pronot. angl. 4 millim.

*Hab.* Ceylon (*Lewis*, Coll. Dist.), Pomparipo (Brit. Mus.).

Allied to *P. limosa*, Walk., in colour, but to *P. affinis*, Hagl., in the structure of the pronotum.

*Podops ochracea*, sp. n.

Ochraceous, coarsely and more darkly punctate; head, anterior area and apices of lateral angles to pronotum, and a small foveate spot in each basal angle of the scutellum more or less piceous; body beneath, legs, antennæ, and rostrum ochraceous; disk of abdomen, apical joint of antennæ, coxæ, and bases of femora piceous.

Anterior pronotal spines anteriorly extended, lateral margins of the pronotum almost straight.

Long. 8 millim.; exp. pronot. angl.  $4\frac{3}{4}$  millim.

*Hab.* Tenasserim, Victoria Point (Atkins. Coll., Brit. Mus.); Burma, Arakan (Coll. Dist.).

Allied to *P. limosa*, Walk., but differing by the larger size, different colour of the body beneath and femora, &c.

*Podops dentata*, sp. n.

Above brownish ochraceous; head and pronotum thickly and coarsely punctate, scutellum with the punctures arranged in five longitudinal series, exposed corium also somewhat longitudinally punctate; body beneath and legs concolorous; femora with a pale annulation near apices; apical joint of antennæ and disks of sternum and abdomen more or less piceous.

Pronotum with the lateral margins finely dentate, the anterior lateral angles produced in short more or less horizontal spines, lateral angles obtusely spinous, transversely impressed on anterior disk and behind anterior margin.

Long. 7 millim.; exp. pronot. angl. 4 millim.

*Hab.* Bengal: Maldah (Atkins. Coll., Brit. Mus.), Calcutta (Coll. Dist.).

Allied to *P. serrata*, Voll., by the structure of the lateral pronotal margins, but very distinct from that species.

XXXII.—*Descriptions of some supposed new Species of Diplommata, Opisthostoma, and a new Variety of Alycæus from N. Borneo, Banguay Island, and Darjeeling.* By HUGH FULTON.

*Alycæus Fultoni*, Mölldff., var. *degenerans*, v. n.

Compared with typical *Fultoni* this variety is smaller, of a less bright yellow colour, obsoletely angled at the periphery on front of last whorl, the oblique striæ are somewhat stronger, and the last whorl is not so swollen at the sides as in typical form.

Alt.  $5\frac{1}{4}$  millim.; diam. maj.  $5\frac{1}{2}$  millim.

*Hab.* Gomanton, N. Borneo.

*Opisthostoma concinnum*, sp. n.

Shell conical, reddish above, shining golden colour below, lower part ornamented with oblique somewhat waved costæ; whorls  $6\frac{1}{2}$ , angularly convex, slowly increasing, last whorl slightly deflected at the constriction, becoming free at its

termination; aperture circular; peristome thin, slightly expanded, margined by a moderately broad rim or flange.

Alt.  $2\frac{1}{2}$  millim.; diam. maj. 3 millim.

*Hab.* Gomanton, N. Borneo.

Compared with *O. Linteræ*, Sowb., to which it bears a close superficial resemblance, the present species is slightly smaller, the whorls are narrower and increase less quickly, and the last half-whorl (free portion) is more angular.

The costæ on last whorl of *concinnum* form narrow, almost complete, tubes, whereas in *Linteræ* the costæ extend across the whorl as in *O. pulchellum*. The deflection at the constriction is also greater in *Linteræ*.

*Opisthostoma simplex*, sp. n.

Shell pyramidal, narrowly perforate, apical whorls reddish, lower whorls of a somewhat shining golden colour; whorls 6, convex, slowly increasing, ornamented with close oblique costæ; aperture circular; peristome thin, slightly expanded, not free, right-hand margin touching the whorls, bordered at the inner margin with a narrow thin rim or flange which is expanded at the upper part.

Alt.  $1\frac{3}{4}$  millim.; diam. maj. 2 millim.

*Hab.* Gomanton, N. Borneo.

This form is nearest in its general characters to *O. Austeni*, Smith, but can be readily distinguished from that species by its smaller size and different peristome, which in *Austeni* is rather thick and has practically no flange; whereas in *simplex* the peristome is thin and the flange produced, especially at its upper part. The aperture of *O. Austeni* is somewhat angular, not circular as in *O. simplex*.

*Opisthostoma Smithi*, sp. n.

Shell pyramidal, narrowly perforate, red above, pale yellow below, ornamented with oblique costæ, which are semitubular on lower portion of last half-whorl; whorls 7, angularly convex; aperture circular; peristome free, slightly thickened and expanded, and margined by a moderately wide rim.

Alt. 3 millim.; diam. maj.  $3\frac{1}{4}$  millim.

*Hab.* Banguay Island, Borneo.

This distinct new species is somewhat like *O. Cookei*, Smith, in form; its sculpture is similar to that of *O. Everetti*, Smith, but not so prominently developed as in that species.

Named in honour of Edgar A. Smith, Esq., Assistant-Keeper of Zoology at the British Museum.



*Diplommatina onyx*, sp. n.

Shell dextral, imperforate, ovate-conic, pale yellow, rather solid; whorls 7, convex, ornamented with very faint oblique costæ, penultimate whorl a shade larger than the last; aperture subcircular; peristome solid, with raised inner margin; columella rather thick, vertical, with a strong and prominent entering plait.

Alt.  $2\frac{3}{4}$  millim.; diam. maj.  $1\frac{1}{2}$  millim.

*Hab.* Busau, N. Borneo (*Everett*).

Compared with *D. plecta* this form is smoother, has no transverse fold, the columella is vertical, not oblique, and the peristome is of a different shape.

*Diplommatina plecta*, sp. n.

Shell dextral, imperforate, subfusiform, pale red-brown, subpellucid; whorls 7, convex, ornamented with somewhat inconspicuous oblique costæ, penultimate a trifle larger than the last whorl; aperture subcircular; peristome moderately thickened, inner margin raised; columella thin, oblique, directed outwards; columella plait somewhat prominent; an interior transverse fold is seen from front of last whorl, situated a little below and parallel with the suture.

Alt.  $2\frac{3}{4}$  millim.; diam. maj.  $1\frac{1}{3}$  millim.

*Hab.* Kina Balu, N. Borneo (*Everett*).

Somewhat similar in form to *D. baritensis*, Smith, but with larger penultimate whorl, less numerous and much less distinct oblique costæ; and it is further distinguished by the transverse fold.

*Diplommatina Sykesi*, sp. n.

Shell dextral, subfusiform, imperforate, semitransparent; whorls 8, distinctly convex, first 3 with faint oblique striæ, lower whorls smooth, antepenultimate and last whorl about the same diameter, the penultimate being slightly broader; aperture subcircular, columella plait very prominent; peristome expanded, a slight ridge on the inner margin giving a duplex appearance; columella lip vertical, with angle at base directed towards the left hand.

Alt. 3 millim.; diam. maj.  $1\frac{1}{3}$  millim.

*Hab.* Gomanton, N. Borneo.

I know of no species with which to compare this distinct new form.

Named in honour of E. R. Sykes, Esq., B.A., who has

done, and is still doing, much valuable work in connexion with the study of the Mollusca.

*Diplommata tenuilabiata*, sp. n.

Shell dextral, imperforate, ovate-conic, light red-brown, subpellucid; whorls 7, convex, ornamented above with faint oblique costæ, last two whorls almost smooth, penultimate much larger than the last; aperture subcircular; peristome thin, with raised inner margin; columella thin, vertical, with a moderately prominent entering plait.

Alt.  $2\frac{3}{4}$  millim.; diam. maj.  $1\frac{1}{2}$  millim.

Hab. Banguet Island (Everett).

In general form similar to *D. onyx*, but with a semitransparent appearance, and further distinguished by its larger penultimate whorl.

*Diplommata oviformis*, sp. n.

Shell dextral, ovate, imperforate, very pale yellow, sculptured with oblique, very close-set costæ; whorls  $6\frac{1}{2}$ , convex, the penultimate slightly wider than the last; aperture subcircular; peristome somewhat thickened, inner margin slightly raised; columella lip almost erect, slightly incurved at the middle; columella plait prominent.

Alt.  $2\frac{3}{4}$  millim.; diam. maj.  $1\frac{1}{2}$  millim.

Hab. Darjeeling, India.

In general form very like *D. unguata*, Blanf., but without the peculiar projection on upper part of the peristome, which is almost circular in *D. oviformis*, whereas in *D. unguata* it is angular at the basal portion and turned slightly outwards towards the left hand.

*Diplommata regularis*, sp. n.

Shell dextral, ovate-conic, imperforate, creamy white, ornamented with very distinctly raised, thin, oblique costæ; whorls 7, very convex, first five regularly increasing in diameter, last two about equal; aperture circular; peristome slightly expanded, double; columella plait rather deeply inserted.

Alt.  $2\frac{1}{2}$  millim.; diam. maj. 1 millim.

Hab. Darjeeling, India.

I know of no Indian species nearer to this than *D. pullula*, Bens., which is smaller and has closer and much less prominent costæ.

XXXIII.—*New Neotropical Mammals, with a Note on the Species of Reithrodon.* By OLDFIELD THOMAS, F.R.S.

*Dasypterus ega* and its subspecies.

Examples of *Dasypterus ega* from the wide range of the species agree very closely in size and in the characters of the ears, skull, and teeth; but there is considerable variation in colour and of so distinctly geographical a nature that the different forms should evidently be recognized as subspecies.

The Lower Californian form, *D. e. xanthinus*, has already been described\*.

*Dasypterus ega panamensis*, subsp. n.

General colour dark brownish clay-colour, something between Ridgway's "raw amber" and "clay-colour." Fur black basally, then dull brownish buffy, the extreme tips black. Centre of face similar to back, cheeks from eyes to lips contrasted black. Rump and hairy part of interfemoral verging towards brownish fulvous. Under surface similar to upper.

Forearm 46·5 millim.

*Hab.* Bogava, Chiriqui, Panama. Altitude 250 m.

*Type.* Male. B.M. no. 0. 7. 11. 1. Collected 8th October, 1898, by Mr. H. J. Watson. One specimen.

*Dasypterus ega fuscatus*, subsp. n.

Very similar to *panamensis*, but even darker, the fine black tips to the dorsal hairs more developed, so that the colour may be said to be washed or marbled with black. Crown and centre line of face blackish brown, much darker than the back; cheeks and lips similar, not markedly darker. Interfemoral not more fulvous than back. Under surface similar in its brownish tone to the back, but not black-washed, the hairs being without black tips.

Forearm 47–48 millim.

*Hab.* Rio Cauquete, Cauca River, Colombia. Altitude 1000 m.

*Type.* B.M. no. 99. 9. 6. 5. Collected 15th June, 1898, by J. H. Batty. Three specimens examined, all precisely alike.

This subspecies differs from *panamensis* by its blackish face and more heavily black-washed back.

\* Ann. & Mag. N. H. (6) xx. p. 544 (1897).

*Dasypterus ega*, typical form.

General colour buffy white, without or with scarcely any dark at the bases of the hairs.

*Hab.* Amazonian Valley and Pernambuco, from which latter place came the type of *Tomes's Lasiurus caudatus* \*.

Other Brazilian specimens in spirit seem referable to this form.

*Dasypterus ega argentinus*, subsp. n.

General colour dull buffy, near Ridgway's "cream-buff," but dirtier; not unlike that of *ega*. But the dorsal hairs are prominently black at their bases and finely black at their tips. Head more whitish grey than back, the lips slightly darker. Hairs on interfemoral dull yellowish. Under surface like upper, but the hairs without black tips.

Forearm of type 44.5 millim.

*Hab.* Goya, Corrientes, Argentina.

*Type.* Male. B.M. no. 98.3.4.9. Collected 29th March, 1896, by Mr. R. Perrens. Two specimens.

This southern form differs from true *ega* by its paler colour, still paler head, and the prominent dark bases to the dorsal hairs, these dark bases being nearly or quite obsolete in the Amazonian form.

Besides the skins, a number of specimens in spirit from the same subregion appear to be similarly coloured. Thus I should refer to *argentinus* examples in the British Museum from the Bolivian Chaco (*Borelli*), Paraguayan Chaco (*Boggiani*), and Esperanza, Sante Fé (*Lindner*), and no doubt all members of this species recorded from Argentina belong to the present subspecies.

It is interesting to note that the paler forms *xanthinus* and *argentinus* are at the two extremes of the range of the species, and the dark subspecies *panamensis* and *fuscatus* occupy an intermediate geographical position.

*Felis pajeros crucina*, subsp. n.

It has been noticed by many authors, notably d'Orbigny and Gervais in 1844 †, and Elliot ‡ in 1883, that different specimens of the Pampas Cat varied noticeably in the character of their colour-markings—the southern ones differing, as the first-named authors put it, by the less fulvous tint

\* P.Z.S. 1857, p. 42.

† Guérin, Mag. Zool. (2) Mamm. pl. lviii. & text.

‡ Mon. Felidæ, pl. xi. & text.



of their fur, the more or less complete effacement of their lateral bands, and the blackish colour of the rings on the limbs. Elliot merely speaks of there being two styles of coloration, without connecting the difference with geography.

But a comparison of the specimens in the Museum, and of the descriptions given by various authors, shows at once that it is the Argentine (and perhaps Chilian) form only that corresponds to Azara's description\*, on which the name *pajeros* is based, and that the southern, Patagonian, ones are sufficiently distinct to require a special name.

Taking as type the fine Santa Cruz specimen† obtained by Darwin during the voyage of the 'Beagle,' described and figured by Waterhouse‡, I propose to apply the above term to it. Additional detailed description is not necessary, but I may enlarge the notes above quoted from d'Orbigny and Gervais by saying that the back of the ear is grey basally and black terminally, instead of fulvous narrowly edged with black, the back is more thickly haired and less markedly crested, the tail appears to be shorter and more thickly furred, and the fulvous ("cannelle") marking on the chest is more or less replaced by black and white. Elliot's two figures, though over-coloured, show the two subspecies very well. In the skull the only difference seems to be that in *crucina* the posterior palatal opening is markedly wider than in *pajeros*, and even this may not prove to be constant.

Dr. Matschie§ has made some observations on Argentine and Chilian specimens of this group, but does not refer to the extreme southern form.

### *Nasua quichua*, sp. n.

Most closely allied to *N. montana*, Tschudi, but rather smaller and very different in colour.

Colour, broadly speaking, grey anteriorly and bright rusty posteriorly. Face grizzled grey, with blackish markings on sides of muzzle, reaching back to eyes; white markings above and below posterior half of eyes. Crown and nape olivaceous yellow, with scarcely a trace of central dark streak; region between ears clearer grey. Ears thickly clothed outside and in with greyish-white hairs, those of the back dark basally. Anterior half of body coarsely grizzled grey, the long hairs yellowish white for three fourths their length,

\* Ess. Quadr. Paraguay, i. p. 179 (1801).

† B.M. no. 55. 12. 24. 261.

‡ Zool. Voy. 'Beagle,' Mamm. p. 18, pl. ix. (1838).

§ SB. Ges. Freund. Berl. 1894, p. 60.

their tips broadly black along the median area, these tips lessening and gradually disappearing on the sides: underfur dark chocolate-brown. Posterior half of body bright rufous, the long hairs black for their basal two thirds, then fulvous, with narrow black tips: underfur here quite black. Tail, in continuation with the posterior back, grizzled red, not ringed above, and only indistinctly ringed below with whitish. Under surface dull whitish, the brown underfur showing through. Limbs, both fore and hind, grizzled fulvous proximally, black distally.

Skull smaller than in *N. montana*, scarcely longer, though more heavily built, than that of *N. olivacea*. Nasal region round, not pinched in as in *N. olivacea*. Ridges on posterior palate less developed than in *N. montana*. Bullæ decidedly larger than in that species.

Dimensions of the type (approximate) (measured in skin):—

Head and body 620 millim.; tail 390; hind foot, s. u. 77, c. u. 85; ear 28.

Skull: greatest length 114; basal length 99·5; greatest breadth 59·5; interorbital breadth 22; breadth of brain-case 41; palate length from gnathion 68·3; combined length of three upper molars 17·5.

*Hab.* Jima, Central region of Cordilleras, Province of Azuay, Ecuador. Altitude 2480 m.

*Type.* Male. B.M. no. 77. 4. 3. 5. Collected by Mr. Clarence Buckley.

This species no doubt represents in Ecuador the Peruvian *N. montana*, from which it differs in various details. It has no close relationship either to the ordinary large Nasuas on the one hand, or to the small-toothed *N. olivacea* on the other.

*Nasua olivacea meridensis*, subsp. n.

Similar to the typical form in all respects, in size, quality of fur, in skull and dentition, but distinguished by there being a more or less obvious blackish line down the back, either commencing on the withers or indistinctly continuous with the median facial dark line.

Size as in the typical subspecies, much less than in any other known *Nasua*. General colour coarsely grizzled olivaceous brown. Under surface dull brown. Face greyish brown, lighter over the eyes, and with the usual dark median black line running from the muzzle to the crown. Ears clothed inside and out with pale brown hairs, scarcely lighter at the edge. In the typical form the hairs of the edge are

much lighter than those on the back. Limbs blackish brown. Tail about as long as the body without the head, ringed with black and dull whitish.

Skull and teeth as in the typical form.

Dimensions of the type (measured in the flesh):—

Head and body 540 millim.; tail 275; hind foot, s. u. 69, c. u. 74; ear 40.

Skull: greatest length 113; zygomatic breadth 50; inter-orbital breadth 21.5; palate length from gnathion 69; combined length of three upper molars 12.5.

*Hab.* Culata Mts., Merida, Venezuela. Altitude 4000 m.

*Type.* Male. B.M. no. 98. 7. 1. 4. Collected 6th June, 1897, by Señor S. Briceño. Three specimens examined.

The remarkable small-toothed species *N. olivacea* was described by Gray on an example from Bogota. Other examples from the same region have since been received; they all equally differ from *N. o. meridensis* by their uniform colour, without trace of dorsal stripe.

*Nectomys esmeraldarum*, sp. n.

A small species allied to *N. russulus*, Thos.\*

Size much less than in any known species of *Nectomys*, about as in *Oryzomys flavicans*, to which and to other members of that genus there is a general superficial resemblance. Fur glossy, close, the hairs of the back about 11 millim. in length. General colour of the type and most adult specimen rich shining rufous, darker on the top of the head and along the back, clearer along the sides. Under surface soiled rufous buffy, not sharply defined; the bases of the hair everywhere slaty grey. Ears short, rounded, naked. Hands brown above, the digits lighter. Feet large in proportion to the size of the animal, more or less twisted, as is commonly the case in aquatic animals, and with large powerful claws, their upper surface uniformly brown. Tail thinly haired, finely scaled, the rings of scales about 14 to the centimetre, uniformly dark brown throughout.

Skull with the general build of the other species of *Nectomys*, stout and well ridged. Nasals remarkably narrow throughout, and so attenuated in their posterior two thirds that the two bones together are no broader than one of the premaxillary processes outside them. Supraorbital ridges well developed, overhanging the orbits more than usual, and continued backward across the parietal to the outer corners of

\* Ann. & Mag. N. H. (6) xx. p. 547 (1897).

the interparietals. Palatal foramina short, not nearly reaching to the molars. Posterior nares wide, though not so wide as in *N. russulus*. Incisors broad and powerful. Molars broad and short, their structure as in the allied species.

Dimensions of the type (measured in the flesh):—

Head and body 141 millim.; tail 149; hind foot, s. u. 33, c. u. 36; ear 15.

Skull: greatest length 34; basilar length 27; greatest breadth 18·2; nasals, length 14, greatest breadth 3·8, breadth at half their length 2·1; interorbital breadth 5·9; interparietals 2·9 × 8; palate length 16·5; diastema 10; palatal foramina 5·4; length of upper molar series 5·3.

*Hab.* St. Javier, Esmeraldas Prov., N.W. Ecuador. Altitude 20 m.

*Type.* Male. B.M. no. 1. 3. 19. 8. Collected 11th July, 1900. Three specimens examined.

This is a most interesting species, as forming with *N. russulus* a special group less adapted for an aquatic life than the typical *Nectomys*. Like that species, it has a very *Oryzomys*-like general appearance, and might easily be supposed to be a member of that genus if the skull were not examined. Allen's *Sigmodontomys alfaroi* is also probably a member of the same group.

*N. esmeraldarum* is very readily distinguishable both from *N. russulus* and Dr. Allen's *alfaroi* by its smaller size, more broadly ridged skull, and different colour. Its unusually narrow nasals may perhaps prove to be abnormal, as a younger specimen than the type has them already slightly broader.

### *Oryzomys tectus*, sp. n.

A large species with a general resemblance to the *O. flavicans* group, but brighter-coloured and with remarkably expanded supraorbital ridges.

Size fairly large. Fur long, close, straight, and crisp; hairs of back about 13 millim. in length and very uniform. General colour above rich uniform tawny fulvous, but little lined with black. Sides brighter and more ochraceous. Face duller and greyer mesially, the upper lips fulvous. Ears short, rounded, a tuft of ochraceous hairs behind their posterior bases. Chin white, the hairs white to their bases. Rest of under surface buffy, continuous with but paler than the colour of the sides; the hairs everywhere slaty basally. Upper surface of hands and feet pale buffy; palms and soles flesh-coloured. Tail of average length, finely and thinly



haired, the scales not hidden; brown above, white below, especially proximally.

Skull stoutly built and quite unlike that of any of the allied species in the great development of the supraorbital ridges, which are expanded and overhanging somewhat as in the otherwise very different *O. chrysomelas*, Allen. The frontal region is strongly concave on each side internal to the ridges, which project about  $1\frac{1}{2}$  millim. outwards and slightly upwards. Behind the ridges pass round across the parietals in the usual way. Muzzle rather heavily built. Nasals evenly tapering backwards, ending just level with the premaxillary processes. Palatal foramina small, not reaching to the level of the molars. Molars light and delicate.

Dimensions of the type (measured in the flesh):—

Head and body 140 millim.; tail 142; hind foot, s. u. 27, c. u. 29.5; ear 18.

Skull: tip of nasals to back of interparietal 33; greatest breadth 17; nasals  $11.6 \times 4$ ; interorbital breadth 6.5; palate length 13.8; diastema 8.1; palatal foramina  $5 \times 2.2$ ; length of upper molar series 4.9.

*Hab.* Bogava, Chiriqui, Panama. Altitude 250 m.

*Type.* Male. B.M. no. O. 7. 11. 43. Original number 64. Collected 15th September, 1898, by Mr. H. J. Watson.

The striking characters of colour and skull-structure will readily separate this fine species from any of its congeners.

*Oryzomys panamensis*, sp. n.

A rich fulvous member of the *O. laticeps* group.

Size about as in other members of the group. Fur close, crisp, and velvety; hairs of back about 6–7 millim. in length. General colour above bright tawny or tawny ochraceous from nape to tail, finely lined with blackish on the back, brighter and clearer on the sides. Head more greyish. Under surface soiled grey, fairly sharply defined, the hairs short, their basal halves everywhere slaty and their terminal white. Ears short, rounded, very finely haired, uniformly brown. Outer sides of arms and legs greyer than body, inner sides like belly; hands and feet whitish above; palms and soles pale flesh-colour. Tail of medium length, thinly haired, the scales not hidden; pale brown above and white below.

Skull in size and proportions very like that of *O. velutinus*, All. & Chapm. Nasals very narrow, evenly tapering backwards. Supraorbital edges sharply and finely beaded, without heavy ridges. Palatal foramina short, not nearly reaching to the molars. Molars small, narrow, and delicate.

Dimensions of the type (measured in the flesh):—

Head and body 131 millim.; tail 130; hind foot, s. u. 27, c. u. 28·5; ear 18.

Skull: tip of nasals to front of interparietal 28·5; zygomatic breadth 16·4; nasals  $12·5 \times 3·5$ ; interorbital breadth 5; diastema 8·9; palatal foramina  $4·7 \times 2·5$ ; length of molar series 4·2.

*Hab.* Panama (City of). "Trapped in yucca cultivation near open Savanna."

*Type.* Female. B.M. no. 0. 5. 1. 67. Collected 25th February, 1899, by E. André.

This species is most like *O. velutinus*, but may be distinguished by its brighter fulvous-tawny colour. The other members of the group are more brown or rufous.

*Eligmodontia callosa boliviæ*, subsp. n.

General colour above mouse-grey, more or less washed with dull yellowish, which latter colour varies in intensity in the different specimens, and is most marked on the rump. Sides more buffy, an indistinct buffy line edging the belly. Under surface uniform pale buffy, not sharply defined, the hairs slaty basally. Centre of face like back, cheeks like sides. Ears of medium size, thinly haired, greyish, not or scarcely darker than the body; the usual whitish postauricular spot less developed than in other members of the group. Arms and legs greyish white, hands and feet clear buffy white. Tail very finely scaled, closely and finely haired, brown above, whiter below.

Skull very like that of the typical form, with the same evenly divergent, well-marked, supraorbital ridges, long palatal foramina, and other details. Molars smaller and lighter throughout.

Dimensions of the type (measured in the flesh):—

Head and body 106 millim.; tail 82; hind foot (s. u.) 21; ear 19.

Skull: greatest length 28·8; basilar length 22·2; greatest breadth 14·6; nasals  $11·8 \times 3·7$ ; interorbital breadth 3·6; diastema 7·4; palatal foramina  $6·6 \times 2·2$ ; length of upper molar series 4·1.

*Hab.* Rio Solocame, 67° W., 16° S. Bolivia. Altitude 1200 m. Other specimens from Yungas, 1500 m., and Astillero, 2700 m.

*Type.* Male. B.M. no. 1. 6. 7. 43. Original number 1325. Collected 24th January, 1901, by P. O. Simons. Five specimens examined.

This *Eligmodontia* is clearly the Bolivian representative of *E. callosa*, Rengg., from which it differs by its rather smaller teeth and more buffy under surface.

“*Phyllotis*” *sublimis* and the *Species* of *Reithrodon*  
and *Euneomys*.

A further examination of the peculiar mouse recently described as *Phyllotis sublimis*\* shows that the incisors, although practically ungrooved in the type, are indistinctly grooved in younger specimens. The grooving is very faint, but not fainter than is often the case in specimens of *Reithrodon pictus*, to whose neighbourhood I now think *Phyllotis sublimis* should be transferred. Viewed as a *Phyllotis*, the species always appeared anomalous, and the incisors have evidently now given a proper indication of its affinities; for its relationship in essential characters to *Reithrodon pictus* is quite clear, greatly as it differs in size and other specific marks.

But in transferring the species the question of the division of “*Reithrodon*” into two has been again examined, and I now think, especially since the removal of *Sigmomys Alstoni*†, that Coues’s suggestion‡ as to the breaking up of Waterhouse’s genus into *Reithrodon* and *Euneomys* should be adopted, the two groups differing markedly in both cranial and dental structure. The wide difference in the formation of the last upper molar is especially noteworthy.

The species of South-American groove-toothed Muridæ would then be allocated as follows:—

I. REITHRODON, Waterhouse.

Species : *R. cuniculoides*, Waterh.  
*R. typicus*, Waterh.

II. EUNEOMYS, Coues.

Species : *E. chinchilloides*, Waterh.  
*E. pictus*, Thos.  
*E. sublimis*, Thos.  
*E. fossor*, Thos.

III. SIGMOMYS, Thos.

Species : *S. Alstoni*, Thos.  
*S. savannarum*, Thos.

\* Ann. & Mag. Nat. Hist. (7) vi. p. 467 (1900).

† Op. cit. viii. p. 150 (1901).

‡ Proc. Acad. Philad. 1874, p. 185.

The northern *Reithrodontomys* also just enters South America, a single species—*R. Söderströmi*—occurring in Ecuador.

The exact position of *Phyllotis boliviensis* is also somewhat doubtful, as, in spite of its ungrooved incisors, it shows many points of resemblance to *Euneomys pictus* and *sublimis*.

These conclusions have been arrived at in consultation and agreement with Dr. J. A. Allen, whose advice has naturally been of much assistance to me.

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XXXIV.—*New Species of Macroscelides and Glauconycteris.*  
By OLDFIELD THOMAS, F.R.S.

*Macroscelides somalicus*, sp. n.

Closely allied to *M. Peasei*\* from Abyssinia, agreeing with that species in size and all important characters. But the general colour is quite different, being paler and of a more fulvous or pinkish-buffy tone, not to be matched in Ridgway—something between ochraceous buff and vinaceous buff would be the nearest. This colour is only spread over the dorsal area, the flanks being abruptly paler and greyer. Postauricular patches well-marked fulvous buffy, whiter close to the bases of the ears. Other characters as described in *M. Peasei*.

Dimensions of the type, a fully adult male (measured in the flesh) :—

Head and body 117 millim.; tail 146 †; hind foot (s. u.) 33; ear 24.

Skull: greatest length 36; basal length 31; greatest breadth 20·5; length of nasals 13·5; interorbital breadth 6·1; length of upper tooth-row 18.

*Hab.* Arabsiyo, Somaliland. Altitude 4000 feet.

*Type.* Adult male. B.M. no. 98. 6. 9. 2. Collected December 1, 1897, and presented by R. McD. Hawker, Esq. Another younger specimen from the same region collected and presented by E. Lort Phillips, Esq.

These specimens had been wrongly assigned to *M. Revoilii*, Huet, of which the Museum now contains a good series presented by Dr. A. E. Atkinson.

\* Ann. & Mag. N. H. (7) viii. p. 154 (1901).

† This seems overstated. In its present condition the tail is rather more than 130 millim. long.



*Glauconycteris beatrix*, sp. n.

A small blackish species of the group with brown unicolor wings.

Size rather less than in *G. poensis*. General colour above and below uniform blackish brown without lighter markings; wings and interfemoral membranes uniformly brown throughout. Muzzle broad and tumid; lobes at corner of mouth well developed. Inner margins of ears extremely convex forwards, forming, from the rounded basal lobe to the tip, approximately the half of a circle; tip scarcely perceptible; outer margin straight above, then convex, with a well-marked angular antitragal lobe.

Tragus short, fairly broad, its inner margin straight, its tip rounded, its outer margin evenly convex, with a well-marked basal lobule.

Wings to the base of the toes. No postcalcareal lobule. Tail included in membrane to its extreme tip.

Skull, as compared with that of *G. poensis*, smaller, more delicately built, and with a narrower muzzle.

Inner upper incisors with the secondary cusp longer and more widely separated from the main one than in *G. poensis*; outer incisor fairly large, pressed against the canines behind, and reaching vertically about half the height of the secondary cusp of  $i^1$ ; in transverse section it appears to be about half the area of the same tooth. In *G. poensis* it is shorter, smaller in area, and is separated on each side from the canine. Lower incisors bifid, slightly overlapping. Anterior lower premolar with a long well-defined main cusp half the height of the posterior premolar.

Dimensions of the type (measured in spirit):—

Forearm 39 millim.

Head and body 45; tail 43; ear 10; tragus on inner edge 3; middle finger, metacarpal 38, first phalanx 13.5, second phalanx 23; lower leg 19.5; hind foot (c. u.) 7.5; calcar 13.

Skull: occiput to gnathion 11.1; interorbital breadth 4.2; breadth across brain-case 7; front of canine to back of  $m^3$  4.2.

*Hab.* Benito River, French Congo, fifteen miles from mouth.

*Type.* Female. B.M. no. 98. 5. 4. 19. Collected January, 1898, by Mr. G. L. Bates.

The only near ally of this species appears to be *G. poensis*, and from that it is readily distinguishable by its smaller size,

darker colour, and the dental and cranial characters above described. *G. congicus*, Noack, is probably synonymous with *G. poensis*, the describer having been misled by Dobson's erroneous statement that the inner upper incisors of the latter species were unicuspid.

XXXV.—*On a new Genus and Two new Species of African Cetoniidæ.* By GILBERT J. ARROW, F.E.S.

IN a collection of Coleoptera from Mashonaland lately received from Mr. Guy A. K. Marshall is a species of Cetoniidæ of such peculiar form that it was only by a minute study of its structure that I could convince myself that it really belonged to that family of beetles. Although it proves to have a close relationship to the somewhat aberrant genus *Myoderma*, it is so far modified in outward appearance, apparently in adaptation to a highly peculiar mode of life, that there can be no doubt, I think, as to the propriety of bestowing upon it a new generic, as well as specific, name. From its assimilation in form to the Dynastid type, and especially that of the American genus *Ligyrrus*, I have given it the name of

LIGYROMORPHUS.

Corpus globosum, undique setosum. Pedes breves, tarsi exigui, tibiis anticis bidentatis, dentibus spatulatis, tibiis quatuor posticis extus grosse asperatis, medio tuberculatis, apice dilatatis. Processus sternalis nullus. Clypeus longus, excavatus, marginis antici medio paulo lobato. Labium fortiter bilobatum.

*Ligyromorphus rufiventris*, sp. n.

Oblongo-rotundatus, nigro-fuscus, opacus, corpore subtus cum pygidio rufis, supra undique rugoso-punctato, minutissime setoso; capite angusto, oculis parvis, clypeo excavato, marginis medio paulo producto; prothorace strigoso-punctato, lateribus valde curvatis, haud angulatis, angulis posticis obtusis, margine postico leviter trisinuato; scutello breviter triangulari, lateribus extremis politis; elytris convexis, vage costatis, lateribus fortiter et regulariter curvatis; pygidio corporeque subtus læte rufis, longe et dense fulvo-hirtis; pedibus rufo-fuscis, brevibus, tarsi brevissimis et tenuissimis, tibiis anticis dentibus duo fortibus et obtusis armatis, dente secundo mediano, tibiis quatuor posticis dense asperatis et hirtis, medio tuberculatis.

Long. 13–16 mm.

*Hab.* MASHONALAND, Salisbury.

The rotund form of this insect with its short, evidently fossorial, legs and clothing of hairs and setæ give it an aspect farther removed from that characteristic of its family than is shown by any other member of the group known to me. The head, with the mouth-organs, and the under surface of the body are almost as in the genus *Myoderma*, but there is no production of the mesosternum. There is no flattening of the upper surface, which is uniformly finely rugose and clothed with very short golden setæ. The sutural margins of the elytra are strongly raised and there are four other narrow costæ, sometimes hardly traceable. The pygidium and under surface are red and densely hairy. The legs are very short, with strong spiny tibiæ and thread-like tarsi, and the front tibiæ have two strong spatulate teeth. The whole structure unmistakably indicates a burrowing habit, but nothing is at present known as to the insect's manner of life. The specimens collected by Mr. Marshall were found on the wing at dusk in the month of November. They include both sexes, which do not differ externally.

The following new species of the allied genus *Myoderma* may be conveniently described here:—

*Myoderma nigra*, sp. n.

*Nigra*, nitida, depressa, clypeo quadrato, margine elevato, medio paulo lobato; prothorace crebre et grosse punctato, lateribus postice rectis, ante medium valde angulatis et retractis, angulis posticis fere acutis, margine postico lobato; scutello medio punctato; elytris subtiliter sat crebre punctatis, striatis, intervallis convexis, striis quarto et quinto postice abbreviatis, lateribus parum curvatis, apicibus ad suturam obtuse angulatis; pygidio corporeque subtus fusco-hirtis, pedibus concoloribus, tibiis anticis obtuse tridentatis, posticis quatuor medio tuberculatis; mesosterno paulo producto, antice rectangulari.

Long. 17 mm.

*Hab.* W. AFRICA, Mt. Cameroons.

Two male specimens of this insect were found by Sir H. Johnston in 1886 at an altitude of 8000–10,000 feet upon the Cameroons Mountain. It differs from all other known species of the genus by its uniform black colour and the configuration of the surface of its elytra. The latter do not exhibit rather widely separated ridges, as is usually the case, the intervals which separate the latter being in *M. nigra* themselves elevated so that the whole surface is broken up

into nearly equal costæ. The pygidium and ventral surface are rather thickly clothed with stiff brown hairs, and extremely minute hairs may be detected also upon the upper surface, but these are not at all evident.

This insect brings the number of described species of the genus *Myoderma* to eight, of which seven have been discovered since the publication of the Munich Catalogue.

### BIBLIOGRAPHICAL NOTICE.

*Zoological Gleanings from the Royal Indian Marine Survey Ship 'Investigator.'* By A. W. ALCOCK. Simla, 1901. 4to. (Reprint from the Scientific Memoirs by Medical Officers of the Army, India. Part XII., pp. 35-76.)

MANY of the biological observations made through the medium of the 'Investigator' are buried in reports not readily accessible, and many are scattered among systematic papers where they are easily overlooked. Major Alcock therefore has thought it advisable to collect and classify them in a summary, together with other hitherto unpublished facts selected from his Journal.

Biological students are much indebted to Major Alcock for thus having brought this miscellaneous information within their reach, and we think it but right to assist him in this service to science by placing before the readers of the 'Annals' a list of the contents of this collection of observations:—

- I. Illustrations of Commensalism among: 1. Sponges; 2. Zoo-phytes; 3. Echinoderms; 4. Crustaceans; 5. Mollusca; 6. Fishes.
- II. Notes on Sexual Characters, Pairing, and Viviparity among Marine Animals:—
  1. Pairing and Parental Care among Echinoderms.
  2. On Secondary Sexual Characters and Pairing among Crustaceans.
  3. On certain Primary Sexual Characters in certain Bony Fishes.
  4. On certain Secondary Sexual Characters in certain Bony Fishes.
  5. On Pairing among Eels.
  6. On Viviparous Bony Fishes.
  7. On Viviparous Elasmobranch Fishes.
- III. On the Sounds made by certain Marine Animals: 1, by Crustaceans; 2, by Fishes.
- IV. Miscellaneous Notes on Stalk-eyed Crustaceans:—
  1. The early Larval Stages of *Hippa asiatica*, *Thenus orientalis*, and *Nephrops andamanica*.
  2. On some curious Habits of Land Hermit-crabs.



3. On the Courting Attitudes of the Fiddler-crab, *Gelasimus annulipes*.
4. On the Habits of some Indian Species of Ocypode Crabs.
5. Some Protective Disguises among Higher Crustacea.
6. On the Geographical Distribution of *Varuna literata*, *Plagusia squamosa*, and *Carcinus mænas*.
- V. Some Instances of Protective and Warning Coloration.
- VI. On the Phosphorescence of certain Marine Invertebrates.
- VII. Notes on some Peculiarities of Food.
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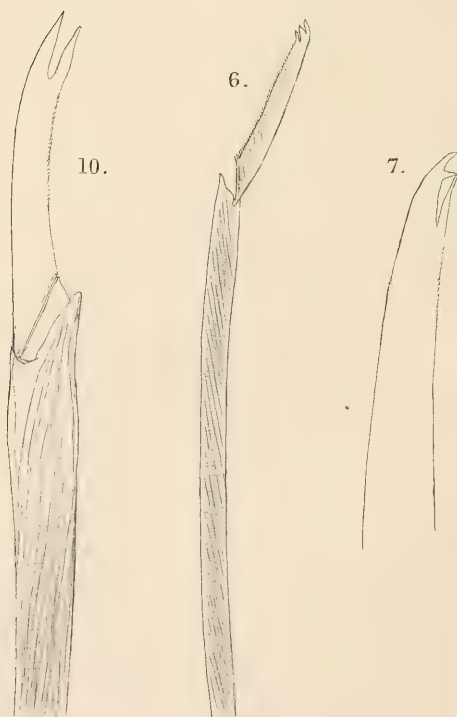
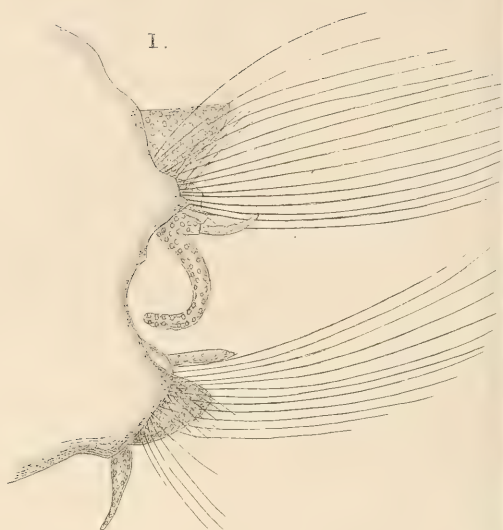
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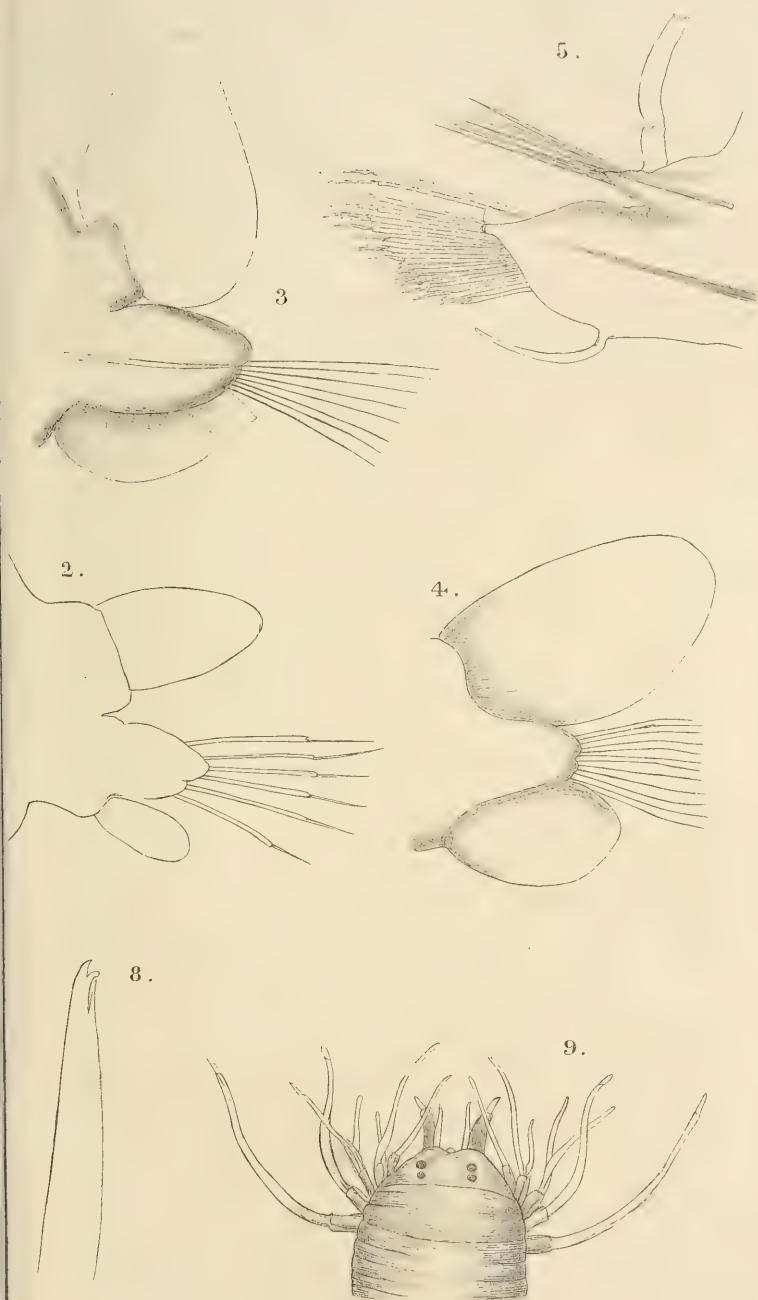
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## THE ANNALS

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## MAGAZINE OF NATURAL HISTORY.

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No. 46. OCTOBER 1901.

XXXVI.—*Notes on the Classification of Teleostean Fishes.*—I. *On the Trachinidæ and their Allies.* By G. A. BOULENGER, F.R.S.

IN his remarks on the Trachinoid Fishes, in 1861\*, Dr. Günther explained that this family had been established by him "for those Acanthopterygian Fishes which have the spinous portion of their dorsal fin much less developed and shorter than the soft, the anal fin similarly developed to the soft dorsal, and the ventrals composed of one spine and five rays. Their gill-openings are wide and the caudal portion of their vertebral column is formed by many more vertebrae than the abdominal"†. "Such," he added, "are the positive characters by which they may be easily distinguished from the Sciænidae, Carangidae, Blenniidae, Gobiidae, Trichonotidae, &c.; whilst the negative character, that of the absence of an infraorbital bone joined to the præoperculum, distinguishes them from the Cottidae. Other negative characters, as, for instance, the absence of finlets behind the dorsal and anal, the entire absence or the small number of pyloric appendages, separate them from some of the Scomberoid genera,

\* Ann. &amp; Mag. Nat. Hist. (3) vii. 1861, p. 85.

† This latter character is incorrect so far as *Uranoscopus* and *Chænichthys* (*Champsocephalus*) are concerned.

which otherwise would appear to have a great affinity to them." He then divides the family into four groups, as follows:—

Eyes on the upper surface of the head; lateral line continuous .....	a. <i>Uranoscopina</i> .
Eyes more or less lateral; lateral line continuous; no larger tooth on the posterior portion of the intermaxillary .....	b. <i>Trachinina</i> .
Eyes lateral; a larger tooth on the posterior portion of the intermaxillary .....	c. <i>Pinguipedina</i> .
Lateral line interrupted or not continued to the caudal fin; one dorsal.....	d. <i>Pseudochromides</i> .
Lateral line interrupted *; two dorsal fins .....	e. <i>Nototheniina</i> .

This arrangement, slightly modified from that proposed in the 'Catalogue of Fishes,' was still maintained in the 'Study of Fishes' in 1880, and has been followed, with greater or less modifications, bearing chiefly on the hierarchical importance of the divisions, by most subsequent writers.

It will strike one, however, that hardly any account has been taken of osteological characters or of the position of the ventral fins, to which, as a rule, very great importance is attached. And any one at all familiar with fishes will soon discover that the Trachinidæ are made up of a very incongruous assemblage of genera, connected together merely by trivial characters of the most superficial nature, such as the position of the eyes, the extent of the dorsal and anal fins, &c.

Although I am, I believe, the first to repudiate this association altogether on osteological grounds, and to apply the results of a study of its components to a radical reconstruction of the taxonomic system, I am not by any means the first to perceive its defects. Dr. Gill † and Bleeker ‡ especially have expressed dissent, although, in my opinion, the changes they have proposed are far from having all been improvements.

Dr. Gill, in 1861 §, after excluding the *Uranoscopina*, *Pinguipedina*, and *Pseudochromides*, proposed to split up

\* Should read "lateral lines two."

† "Synopsis of the Sillaginoids," Proc. Ac. Philad. 1861, p. 501; "Synopsis of the Chænichthyoids," *t. c.* p. 507; "Synopsis of the Harpagiferoids," *t. c.* p. 510; "Synopsis of the Notothenioids," *t. c.* p. 512; "On the Limits and Affinity of the Family of Leptoscopoids," *op. cit.* 1862, p. 501; "Arrangement of the Families of Fishes," *Smithson. Miscell. Coll.* xi. no. 247 (1872); "Families and Subfamilies of Fishes," *Mem. Ac. Sc. Washingt.* vi. 1893, p. 127.

‡ "Mémoire sur les Sciénoïdes et les Sillaginoïdes," *Verh. Akad. Amsterd.* xiv. no. 4 (1874); "Sur la Famille des Pseudochromidoïdes," *op. cit.* xv. no. 5 (1875).

§ Proc. Acad. Philad. 1861, p. 514.

Dr. Günther's Trachinidæ into seven families, which he thus defined :—

- I. Lower pectoral rays simply articulated.
  - A. Ventral fins thoracic. First and second dorsals subequal ..... *Trichodontidæ*.
  - B. Ventral fins jugular.
    - 1. Ventrals approximated. Anal very long. Body scaly ..... *Trachinidæ*.
    - 2. Ventrals separated by a wide area. Anal moderate. Body naked ..... *Bovichthyidæ*.
- II. Lower pectoral rays branched.
  - A. Head cavernous. Præoperculum abruptly bent inwards beneath the head. Ventrals thoracic. .... *Sillaginoidæ*.
  - B. Head with bones not cavernous. Ventrals jugular or subjugular.
    - 1. Snout not produced. Body scaly.
      - a. Lateral line submedian along tail ..... *Latiloidæ*.
      - b. Lateral line interrupted or continuous on the tail ..... *Notothenioidæ*.
    - 2. Snout spatuliform. Body naked ..... *Chænichthyoidæ*.

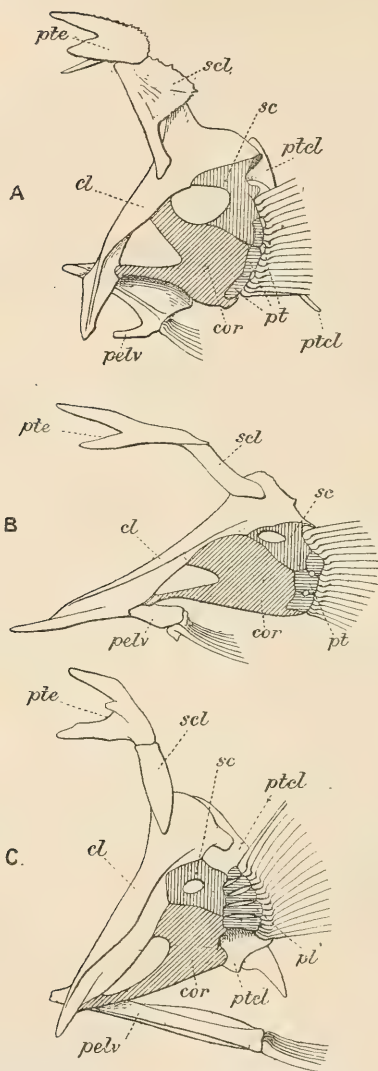
The characters used in this synopsis are mostly very trivial and inadequate for establishing families, nor, with the exception of that derived from the position of the ventral fins, has their diagnostic value been confirmed by the examination of the skeleton which has since been made.

In his latest arrangement of the fishes, in 1893, the families are thus dispersed by Dr. Gill. The divisions are, however, unaccompanied by definitions :—

- I. Related to PERCOIDEA : *Sillaginidæ*.
- II. PERCOPHOIDEA (described as an undoubtedly heterogeneous group in need of a thorough revision) : *Pseudochromidæ*, *Malacanthidæ*, *Bathymastridæ*, *Percophiidæ*, *Nototheniidæ*, *Harpagiferidæ*, *Chænichthyidæ*, *Chiasmodontidæ*, *Opisthognathidæ*, *Bovichthyidæ*, *Trichodontidæ*, *Hemerocætidæ*.
- III. TRACHINOIDEA : *Trachinidæ*.
- IV. URANOSCOPOIDEA : *Uranoscopidæ*, *Leptoscopidæ*, *Dactyloscopidæ*.

An examination of *Trachinus* shows that it differs essentially from the Perciformes in the truly jugular position of the ventrals and in the structure of the pectoral fin, which is supported by the scapula and short and broad pterygials, of which only two are in contact with the scapula (fig. A, p. 264) ; and these two characters I consider to be diagnostic of the forms truly related to *Trachinus*. Whilst in the "thoracic" Perciformes the pectoral fin is entirely supported by the pterygials, which are more or





Shoulder-girdle and pelvis of  
 A. *Trachinus draco*. B. *Percophis brasiliensis*. C. *Caulolatilus princeps*.

cor. Coracoid.  
 cl. Clavicle.  
 pelv. Pelvis.  
 pt. Pterygials.

ptcl. Post-clavicle.  
 pte. Post-temporal.  
 sc. Scapula.  
 scl. Supraclavicle.

less narrow and hourglass-shaped, and of which at least three are in contact with the scapula (fig. C). Further, the shoulder-girdle of *Trachinus* differs from that of the Perciformes in having the scapular fenestra pierced not within the scapula, but between it and the coracoid, in this respect resembling the likewise jugular Gadidæ †, which may be distinguished by the narrower and hourglass-shaped pterygials and the ribs inserted on long parapophyses.

Availing myself of other characters which I have found to offer reliable indications of relationship in different groups of Acanthopterygians, I would add that the second suborbital is produced in an internal lamina supporting the globe of the eye, that the ribs and epipleurals are nearly equally developed and sessile, close together at the base, and that the posterior præcaudal vertebræ emit short parapophyses.

These characters serving to diagnose the Trachinidæ, with the single genus *Trachinus*, we may examine how far the other genera previously associated with them agree or disagree and what appear to be their relationships.

Among the forms of the southern hemisphere there are several genera that agree with *Trachinus* in the structure of the pectoral arch and pelvis and also in the vertebral column, which differ only in the absence of a subocular lamina. These, enumerated in the following synopsis, may be grouped together under the name Nototheniidæ.

- |  |                               |
|--|-------------------------------|
| I. Gill-membranes free or narrowly attached to the isthmus.                    |                               |
| A. Dorsal formed of two portions, which may be united at the base.             |                               |
| 1. Two lateral lines, the lower of which may be confined to the caudal region. |                               |
| Body covered with ctenoid scales . . . . .                                     | <i>Notothenia</i> , Rich.     |
| Body naked; lateral line with granulated plates; snout spatulate . . . . .     | <i>Chænichthys</i> , Rich.    |
| Body entirely naked; snout spatulate . . . . .                                 | <i>Champscephalus</i> , Gill. |
| 2. Three lateral lines; body naked . . . .                                     | <i>Cryodraco</i> , Dollo.*    |
| 3. A single lateral line.  |                               |
| a. Body scaly.   |                               |
| a. Dorsal fins more or less united at the base; a feeble opercular spine.      |                               |

---

† This character has been employed by Cope (Tr. Amer. Philos. Soc. xiv. 1871, p. 458) and by Gill (Proc. Acad. Philad. 1884, p. 170) to define the "Anacanthini," but they do not appear to have been aware of its being shared by the Trachinidæ, Nototheniidæ, Trichonotidæ, and Callionymidæ. Jordan and Evermann (Fish. N. Amer. iii. p. 2528) even add that it differentiates the "Anacanthini" from all other typical fishes.

Teeth on vomer and palatines .....	<i>Parapercis</i> , Blkr. <sup>1</sup>
Teeth on vomer only .....	<i>Neopercis</i> , Sldr.
β. Dorsal fins perfectly distinct.	
Teeth on vomer and palatines; head armed....	<i>Centropercis</i> , Ogilby.*
Teeth on vomer and palatines; opercle with a flat spine .....	<i>Pseuduphritis</i> , Casteln. <sup>2</sup>
Teeth on vomer only; a præorbital spine.....	<i>Acanthuphritis</i> , Gthr.
Palate toothless .....	<i>Eleginops</i> , Gill. <sup>3</sup>
b. Body naked; habit cottoid .....	
B. A single dorsal; scales extremely small; snout spatulate; palate toothless.	
Lateral lines two; opercular spines .....	<i>Gerlachia</i> , Dollo.*
Lateral line single; opercular spines .....	<i>Bathyraco</i> , Gthr.
Lateral line single; no opercular spines .....	<i>Racovitza</i> , Dollo.*
II. Gill-membranes broadly united to the isthmus; habit cottoid; body naked; head armed .....	
	<i>Harpagifer</i> , Rich.

The genera marked with an asterisk are only known from the external characters, and so long as the bones at the base of the pectoral fin have not been examined their correct systematic position remains uncertain, as some may belong to the Leptoscopidæ. *Pagetodus*, Rich., rests on an insufficient description and figure.

In *Percophis*, which has always been regarded as allied to *Parapercis*, the pectoral rays and the pterygials are in the same condition as in *Trachinus*, and a subocular lamina is likewise present; but the scapular fenestra is situated entirely in the scapula (fig. B, p. 264). This genus constitutes the family Percophiidæ.

*Bembrops*, Sldr. (*Hypsicometes*, Goode), which resembles some of the Nototheniidæ, and the freshwater genus *Chimarichthys*, Haast, differ from the preceding only in the absence of the subocular lamina. With them I would also associate *Leptoscopus*, which, in spite of the great external resemblance it bears to *Uranoscopus*, differs from it not only in the much more elongate caudal region, but in the distinct pterygials, the sessile ribs, and the feebly developed parapophyses. The name of this family, which leads to the Batrachidæ, should be Leptoscopidæ.

The Uranoscopidæ, thus reduced to *Uranoscopus*, *Anema*, and *Cathetostoma*<sup>4</sup>, are characterized by the much reduced pterygials, fused with the scapula and the coracoid, the scapular fenestra in the scapula, the parapophyses strongly

<sup>1</sup> *Percis*, Bl. Schn., nec Scopoli.

<sup>2</sup> *Aphritis*, Cuv., nec Latr.; *Cottoyperca*, Sldr.

<sup>3</sup> *Eleginus*, Cuv., nec Fischer.

<sup>4</sup> *Dactyloscopus* does not differ from *Clinus* in its pectoral arch. I therefore follow Dr. Günther in placing it with the Bleenniidæ.

developed on most of the præcaudal vertebræ, with the ribs attached to their upper surface.

All these families are nearly related, and may be placed together as "Trachinoidea" if it be thought advisable to retain the group. All lack the air-bladder.

The following tabulation of the numbers of vertebræ (præcaudal+caudal) in the skeletons examined shows that too great an importance has been attached to this character in defining higher groups, a view which accords with the results obtained in other large families of fishes\*.

<i>Trachinus draco</i> .....	11+32=43.
— <i>vipera</i> .....	10+25=35.
<i>Notothenia tessellata</i> .....	16+33=49.
— <i>coriiceps</i> .....	19+34=53.
<i>Champscephalus esox</i> .....	28+29=57.
<i>Parapercis nebulosa</i> .....	11+19=30.
<i>Pseudaphritis Urvillei</i> .....	14+27=41.
— <i>gobio</i> .....	14+27=41.
<i>Eleginops maclovinus</i> .....	20+25=45.
<i>Bovichthys variegatus</i> .....	15+23=38.
<i>Harpagifer bispinis</i> .....	12+24=36.
<i>Percophis brasiliensis</i> .....	22+35=57.
<i>Leptoscopus macropygus</i> ....	10+33=43.
— <i>angusticeps</i> .....	10+36=46.
<i>Uranoscopus scaber</i> .....	12+13=25.
<i>Anema monopterygium</i> .....	14+16=30.
<i>Cathetostoma læve</i> .....	14+16=30.

The Trichonotidæ (*Trichonotus*, *Tæniolabrus*, and *Hemero-cætes*) and the Callionymidæ (*Callionymus* and *Vulsus*) are closely related to each other and to the Trachinoids, and might be included among them†. The fenestra is between the scapula and the coracoid, and only one or two pterygials are in contact with the scapula. A subocular lamina is absent; there are no epipleurals; the parapophyses are short and restricted to the posterior præcaudal vertebræ. In the Trichonotidæ the post-temporal is forked and detached from the skull, as in the Trachinoids; in the Callionymidæ it is also forked, but closely adnate to the skull. The vertebral column of *Callionymus* is very peculiar, and recalls some of the Plectognaths: some of the præcaudal vertebræ have bifid processes to the neural arch, simulating a "spina bifida," and the last two caudal vertebræ are much enlarged. *Trichonotus*,

\* Cf. tabulation of vertebræ in Serraninæ, Cat. Fish. 2nd ed. i. p. 115.

† The genus *Rhyacichthys*, n. n. (*Platyptera*, C. & V., nec Meig.), from the fresh waters of Java, Celebes, the Philippines, and China, which so closely resembles in its adaptive features *Chimarrichthys*, *Homaloptera*, and *Exostoma*, belongs to the Gobiidæ.



*Hemerocætes*, and *Callionymus* agree in having the three occipital cavities for articulation with the first vertebra on a straight transverse line. All three lack the air-bladder.

Number of vertebræ:—

<i>Trichonotus setigerus</i> . . . . .	23+30=53.
<i>Hemerocætes acanthorhynchus</i> . . . . .	14+34=48.
<i>Callionymus lyra</i> . . . . .	7+14=21.
— <i>calaropaumus</i> . . . . .	7+14=21.

A study of the pectoral arch in the "Trachinoid" and "Callionymoid" Fishes shows them to be more closely related to the Gadoids than was hitherto suspected, and it seems to me natural to associate them, together with the Blennioids and Batrachoids, with which they are intimately connected, in a division of the Acanthopterygii, for which the old name Jugulares may be revived. In a later communication I hope to deal with the other members of this great division.

The following forms, which have been associated with the "Trachinoids" by some authors, should be removed from the Jugulares.

1. The Chiasmodontidæ of Gill, which include two deep-sea genera: *Chiasmodon*, Johns. (*Ponerodon*, Alcock), and *Pseudoscopelus*, Lütke. The first was placed with the Gadidæ by Günther, the second with the Berycidæ by Lütken; both near the Trachinidæ by the American authors, among them by Alcock. I have ascertained on *Chiasmodon niger* that the pelvic fins have no connexion with the pectoral arch, fall therefore under the category of abdominal ventrals, that the scapular fenestra is entirely in the scapula, and that the pterygials are small and hourglass-shaped, four in number, three in contact with the scapula.

*Chiasmodon* is not entirely naked, as has been stated\*; it has a series of scales following the course of the lateral line. There are not five, but six ventral rays. An air-bladder is present. According to Alcock the vertebræ number 14+24.

*Champsodon*, Gthr., referred by Günther and by Alcock

\* *Chiasmodon subniger*, Garman, from the Tropical Pacific (919 fath.), is described as having the skin thickly beset with fine spinuloid scales, presenting a pilose appearance. It should probably be made the type of a distinct genus.

to the Trachinidæ, by Gill to the Chænichthyidæ, is related to *Chiasmodon*, and apparently also to *Pseudoscopelus*, with which it agrees in having a complicated system of sensory organs on the body. The ventrals, although situated below the pectorals, are not strictly thoracic, since the pelvis is loosely attached, merely by ligament, to the pectoral arch; the post-temporal is forked; the suborbital arch absent; vertebræ 32 (16+16); strong parapophyses commencing from the third vertebra, the ribs and epipleurals inserted close together near their extremity; a large air-bladder, the pointed posterior extremity of which is encased in a bony capsule formed by the expansion of the parapophyses of the last four præcaudal vertebræ.

The conformation of the pectoral arch and the mode of attachment of the pelvis are opposed to the association of the Chiasmodontidæ with either the Gadidæ or the Trachinidæ in their widest sense. The number of rays to the ventral fin (I 5) is against their incorporation among the Berycidæ, to which, besides, they show no sort of resemblance. The Chiasmodontidæ should, perhaps, provisionally be placed near the Percosoces, together with the Stephanoberycidæ and Tetragonuridæ, but nothing definite can be suggested until the skeleton of the two latter types has been examined.

2. The Trichodontidæ (genera *Trichodon* and *Arctoscopus*), in spite of a superficial resemblance to *Trachinus*, should be referred to the Perciformes. The ventrals are thoracic, the pectorals are entirely supported by five hourglass-shaped pterygials, of which four are in contact with the scapula. *Trichodon Stelleri* has 51 vertebræ (16+35) and no epipleurals; the air-bladder is absent.

This family is most nearly related to the Latrididæ\*.

3. The Sillaginidæ, with the single genus *Sillago*. This genus has been referred by Günther to the Trachinidæ on account of the general resemblance it bears to *Percis* (*Parapercis*). But Cuvier, who had made an anatomical examination of these fishes, was much nearer the truth when he gave it as his opinion that they are most nearly allied to the Sciænidæ, from which he separated them on account of the vomerine teeth. In the structure of the pectoral arch, the thoracic ventrals, the presence of an air-bladder, they differ from the Trachinidæ and agree with the Sciænidæ, and they should therefore be placed near the latter, from which they can only be separated by the presence of vomerine teeth and the elongate anal fin. In the high number of vertebræ

\* Boulenger, Ann. & Mag. Nat. Hist. (6) xviii. 1896, p. 398.

(12-14+14-20) they approach *Collichthys* (11+18) and *Lonchurus* (10+19). I therefore accept the family Sillaginidæ of Richardson as defined by Gill and by Bleeker.

The oblong and elongated cavernous head, with the præopercle bent inwards below, covering a considerable part of the lower surface of the head, recalls *Aspro* among the Percidæ, with which genus *Sillago* has been associated by Bleeker in 1859.

4. The Pseudochromididæ of J. Müller and of Bleeker (partim), including the Malacanthidæ of Günther, the Latilidæ and Opisthognathidæ of Gill, the Bathymasteridæ of Jordan, are Perciformes closely related to the Serranidæ and connected with them through *Plesiops* and allies. The ventrals are truly thoracic, the pelvis being in every way similar to that of the Perches; they are, however, sometimes a little anterior to the insertion of the pectorals, just as in *Centropristes* among the Serranidæ and *Xyrichthys* among the Labridæ, and such a position has been described as "subjugular." Second suborbital with an internal lamina; entopterygoid present; post-temporal forked; anterior vertebræ without transverse processes; ribs inserted on the transverse processes where these are developed; epipleurals inserted at base of ribs; dorsal and anal fins elongate and formed mostly of articulated soft rays.

Nine genera:—

A. With two lateral lines: *Pseudochromis*, Rüpp.; *Cichlops*, M. & T.

B. With a single lateral line: *Opisthognathus*, Cuv.; *Latilus*, C. & V.; *Caulolatilus*, Gill; *Lopholatilus*, Goode & Bean; *Malacanthus*, Cuv.; *Bathymaster*, Cope; *Rathbunella*, Jord. & Everm.

The following table of vertebræ is for comparison with the Serranidæ\*:—

	A.	B.	C.	D.	E.	F.	G.	H.
<i>Pseudochromis persicus</i> . . . . .	26	10	2	3	1	4	2	16
<i>Opisthognathus muscatensis</i> ..	29	11	2	3	1	5	0	18
<i>Latilus argentatus</i> . . . . .	24	11	2	0	0	9	1	13
<i>Caulolatilus princeps</i> . . . . .	27	12	2	0	0	10	0	15
<i>Malacanthus Plumieri</i> . . . . .	24	10	2	0	1	7	0	14
<i>Bathymaster signatus</i> . . . . .	51	15	2	1	0	12	4	36

- A. Total number. B. Præcaudal. C. Ribless, bearing only epipleurals. D. With sessile ribs and no parapophyses. E. With sessile ribs and parapophyses. F. With ribs attached to parapophyses. G. Præcaudal, with closed hæmal arch. H. Caudal.

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\* Cat. Fish. 2nd ed. i. p. 115.

5. The *Pinguipedidæ*, with the single genus *Pinguipes*, agree in all respects with the preceding, but as they lack the subocular lamina they should be regarded as a distinct family. *P. chilensis* has 38 vertebræ (17+21). These fishes bear a certain resemblance to the Labrid *Malopterus*, C. & V. (*Neolabrus*, Stdr.), the skeleton of which is still unknown; but its ally *Ctenolabrus* has 15-17+18-19 vertebræ, which is very near the number in *Pinguipes*.

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XXXVII.—*New Insular Forms of Nasua and Dasyprocta.*  
By OLDFIELD THOMAS.

WHEN examining material in connexion with the new forms of *Nasua* described last month, the specimens from Cozumel Island in the Bay of Honduras struck me as peculiar, and now that the skulls have been prepared I find that this animal should be distinguished from that on the mainland. As I am responsible for its determination as *N. nasica* (see P. Z. S. 1888, p. 129), or *narica*, as I prefer now to call it, I think it well now to set the matter right, and also to point out that another identification made at the same time was erroneous, that of the Agouti from Ruatan, which likewise proves separable from its mainland ally.

*Nasua thersites*, sp. n.

Size markedly less than in the continental *N. narica*. General colour of head, nape, and posterior back dark brown ("seal-brown"), only grizzled across the shoulders, where the tips of the hairs are whitish or ashy. Continental specimens are usually grizzled further down the back. Bases of the brown hairs but little lighter than their tips. Under surface brown posteriorly on the belly, grizzled with whitish on the chest; the chin white. Face, as usual, brown, with a white muzzle and lips, white spots above and below the eye, and whitish lines leading from the eyebrows to the muzzle. Patches on sides of neck whitish, the hairs brown basally. Ears brown externally, white internally and at their edges. Limbs brown, darkening nearly to black on the hands and feet. Tail shaggy, dark brown throughout, slightly darkening terminally, without trace of grizzling or annulation.

General build of skull distinctly that of the *N. narica* type and quite different from that either of the delicate *N. montana* and *quichua* or of the still slenderer *N. olivacea*, although



it does not exceed these latter in length. It is stout and strongly built, the zygomata heavy and widely expanded, the ridges well developed, the muzzle not pinched in above, the posterior palate broad, parallel-sided, and little ridged on its buccal aspect, and the bullæ smaller and less globular than in *N. narica*. Teeth shaped as in *N. narica*, but markedly smaller throughout, about equal in size to those of *N. montana*.

Dimensions of the type (an old male, measured on the remade skin):—

Total length 910 millim.; head and body 530; tail 380; hind foot, s. u. 77, c. u. 85; ear 28.

Skull: greatest length, from convexity above foramen magnum, 109; basal length (c.) 101; zygomatic breadth 64; interorbital breadth 24; breadth of brain-case 41; palate length from gnathion 67; breadth across outside  $m^1$  30; combined length of last three teeth above 18, ditto below 20.

*Hab.* Cozumel Island, off the coast of Yucatan.

*Type.* Old male. B.M. no. 86. 10. 8. 1. Collected January 1886 by G. F. Gaumer, and presented by Messrs. F. D. Godman and O. Salvin. A young female also in the collection.

This animal has no relationship to the small South-American species *N. montana*, *quichua*, and *olivacea*, but is an insular representative of *N. narica*, from which it differs by its rather darker colour and much smaller size.

### *Dasyproctu ruatanica*, sp. n.

Closely allied to *D. punctata*, but much smaller.

Size markedly less than in *D. punctata*. Fur, as in that species, everywhere annulated to the roots with black and ochraceous or yellow, the annulations conspicuous on the surface, though rather less so on the rump. On the whole, the fore back is more ochraceous and the hind back more yellow, but the difference is not conspicuous. Under surface like back, but more olivaceous, and there is a white spot on the chin and a yellow patch on the middle of the lower part of the belly. Crown like fore-back. Ears nearly naked, their few hairs blackish. Limbs like body proximally, darkening terminally on hands and feet to grizzled or deep brown. The youngest specimen has the darkest feet, but this is probably accidental.

Skull in general shape closely agreeing with that of the type of *D. punctata*, but conspicuously smaller in all dimensions.

Dimensions of the type (taken on the remade skin) :—

Head and body 435 millim. ; hind foot, s. u. 90, c. u. 101.

Skull : greatest length 96·5 ; basilar length 70·5 ; zygomatic breadth 46 ; nasals, greatest length 36, greatest breadth 18·7 ; interorbital breadth 27·5 ; diastema 22 ; diagonal length of bulla 15 ; length of upper tooth series 17·4.

*Hab.* Ruatan Island, Bay of Honduras.

*Type.* Adult female. B.M. no. 86. 10. 8. 7. Presented by Messrs. F. D. Godman and O. Salvin. Collected by G. F. Gaumer. Three specimens examined.

This is evidently a pauperized insular representative of the continental *D. punctata*, Gray. In colour it is rather richer than the type, more strongly fulvous anteriorly and yellow posteriorly ; but this is possibly merely due to the age and probable fading of Gray's type specimen.

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XXXVIII.—*On a Collection of Small Mammals from the Upper Nile obtained by Mr. R. M. Hawker.* By OLDFIELD THOMAS, F.R.S.

MR. R. MACDONALD HAWKER, to whom the National Museum already owes many valuable mammals collected by him during his various expeditions into northern and north-eastern Africa, has now presented to the Museum the specimens obtained during his last winter's trip to the Soudan. They were mostly obtained on the White Nile between Fashoda and Khartoum, and are highly valuable both as supplementing the Museum collection, still very incomplete, from the Soudan, and as illustrating the many species described by Heuglin from specimens no longer in existence. The definite identification of these species of Heuglin's is a matter of the utmost value.

The number of species in Mr. Hawker's collection is not very large, but among them there are a new hare and a new gerbille ; and I have also taken the opportunity to describe a new member of the latter group obtained by Lord Delamere in East Africa.

1. *Cercopithecus sabæus*, auctorum, nec Linn.

♂. Renk, 250 miles south of Khartoum. 13th May.

2. *Megaderma frons*, Geoff.

2 ♂. Kaka, 80 miles north of Fashoda. 23rd February.

2 ♂, 1 ♀. Goz Abu Gomer, 200 miles south of Khartoum. 17th May.

Mr. Hawker was much struck with the yellowness of the wings of this bat in life. It was on the wing by day, and looked more like a large yellow butterfly than a bat.

3. *Nycteris hispida*, Geoff.

4 ♂. Kaka. 19th March.

2 ♂. Renk. 13th May.

4. *Pipistrellus Temminckii*, Cretzschm.

♂. Khartoum. 24th January.

♂. Fashoda. 21st March.

♀. Goz Abu Gomer. 15th May.

5. *Crocidura Hedenborgiana*, Sund.

♀. Kaka. 23rd April.

This fine shrew is of particular value as being practically a topotype of Sundevall's species.

6. *Crocidura* sp. (perhaps *C. sericeus*, Sund.).

No. 5. Gebel Akhmed Aga. 21st February.

♂. Fashoda. 30th March and 2nd April.

7. *Felis maniculata*, Rüpp. (?).

Imm. ♀. Fashoda. 8th May.

Brought in by a native. Not to be distinguished from the local domestic cat.

8. *Arvicanthis variegatus*, Licht. (?).

♂. 20 miles north of Fashoda. 10th April.

♂. Kaka. 22nd April.

The relationship of this to the Lower Egyptian form and to Rüppell's *A. abyssinicus* and *lacernatus* is still uncertain.

9. *Arvicanthis testicularis*, Sund.

♂. Khartoum. 22nd January.

Yg. ♀. Duem, 110 miles south of Khartoum. 5th February.

Practically topotypes of the species.

On a closer examination I find that the *Aden Arvicanthis* referred by me to *A. variegatus*\* is really quite indistinguishable from *A. testicularis*. This is a striking example of the general relationship of Aden animals to Soudanese and Abyssinian, rather than to Egyptian forms.

10. *Arvicanthis zebra*, Heugl.

♂. Fashoda. 2nd April.

The posterior back of this mouse is not so rusty as is stated in the original description, but otherwise it agrees fairly well, and may be provisionally referred to Heuglin's species.

11. *Gerbillus*† *stigmonyx luteolus*, subsp. n.

♂. Duem. 23rd May.

Type. B.M. no. 1. 8. 8. 27.

\* P. Z. S. 1895, p. 553.

† I may take this opportunity to describe

*Gerbillus* (*Dipodillus*) *Harwoodi*, sp. n.

A member of the *G. campestris* group, hitherto unrecorded in East Africa.

General colour dark fulvous, decidedly darker along the dorsal area, brighter and richer along the flanks, where it forms a bright fulvous line sharply contrasting with the white of the belly. Under surface pure white throughout, the hairs white to their bases. Crown of head like back; cheeks paler fulvous; postocular light marking indistinct, post-auricular well defined. Ears small, their hairs dull fulvous. Front of fore limbs like body, inner side and upper surface of hands pure white. Outer side of hind limbs like body, but the ankles are darker and more mixed with slaty; inner sides and whole of feet white. Soles almost naked, a few scattered hairs present in the region of the pads, which are, as usual, six in number. Tail long, well haired, but little tufted; brown above and terminally, whitish proximally below.

Skull of the general shape characteristic of the *G. campestris* group.

Dimensions of the type (an adult female, measured in the flesh):—

Head and body 82 millim.; tail 113; hind foot 22; ear 10.

Skull: greatest length 26; basilar length 19; length of nasals 10; interorbital breadth 4.5; parietal breadth 12; interparietal 3.2 × 6.6; diastema 6.5; palatal foramina 5; length of upper molar series 3.6.

*Hab.* Lake Naivasha, British East Africa. Altitude 6300 feet.

*Type.* Female. B.M. no. 0. 6. 21. 17. Original number 12. Collected 15th December, 1899, and presented by Lord Delamere.

So far as I am aware no member of this group has hitherto been described from the East-African region, all the known forms being either large gerbilles of the subgenus *Tatera* or else pigmy forms allied to *G. pusillus*, Peters.

I have named this pretty species after Mr. L. C. Harwood, the taxidermist who accompanied Lord Delamere and prepared the specimens. Mr. Harwood has been on a great number of East- and West-African collecting expeditions, and to his abilities much of the success of these expeditions has been due, at least so far as mammals and birds are concerned.



Closely allied to the typical *G. stigmonyx*, Heugl.\*, from Khartoum, but more heavily built and the colour sandy buffy throughout, very much as in *G. pæcilops*, instead of yellowish. Darker nose-mark and four white facial marks present as usual. White of throat spreading up towards the eyes on the cheeks, but not quite reaching them, a narrow line of buffy passing across.

Skull as in *stigmonyx*, but heavier; the palatal foramina rather more open.

Dimensions of the type (measured in the flesh):—

Head and body 95 millim.; tail 110; hind foot 23; ear 12.

Skull: greatest length 28; basilar length 21; greatest breadth 14; length of nasals 10; interorbital breadth 4·8; parietal breadth 12·2; interparietal 3·5 × 7·5; palatine foramina, length 4·7; diastema 7·2; length of upper molar series 3·6.

In the Anderson collection there are two skins from the neighbourhood of Khartoum, obtained by Mr. H. F. Witherby, which Mr. de Winton thinks, and I agree with him, may be taken to represent Heuglin's *stigmonyx*, though the description might apply to several other species†. This animal is allied to the Aden *G. pæcilops*, having somewhat similar proportions and skull-structure. The soles of the hind feet are of the *Dipodillus* type, but have a number of fine scattered hairs on them in the region of the pads, more typical *Dipodilli* having the soles entirely naked. In this respect, as in others, Mr. Hawker's gerbille agrees with the Khartoum form, and differs from the more northern *G. (D.) Bottai* and *quadrimaculatus*.

## 12. *Mus musculus orientalis*, Cretzschm.

♂. Khartoum. 26th January.

The local form of the house-mouse. Apparently represents *Mus pallescens*, Heugl.

## 13. *Mus macrolepis*, Sund.

2 ♂, 1 ♀. Kaka. 23rd April.

♀. Duem. 21st May.

4 ♂, 3 ♀. Fashoda. 28th to 30th March, 2nd April.

In working out this most difficult group of the genus these specimens, as certainly representing Sundevall's species ("ex

\* Reise N.O.-Afr. ii. p. 78 (1877).

† The specimen marked *stigmonyx* in the Stuttgart Museum does not at all agree with Heuglin's description, and cannot be the type. It is probably a member of the *Gerbillus gerbillus* group.

Sennaar"), are sure to be of the utmost value. As usual, there is considerable variation in colour among them. Heuglin's *Mus lateralis* is probably the same animal.

#### 14. *Lepus Hawkeri*, sp. n.

♂. Kaka. 2nd March.

Type. B.M. no. 1. 8. 8. 40.

Closely allied to *L. æthiopicus*, Ehr., but greyer and less sandy throughout.

Size as in the allied species. General colour above soft fawn-grey, finely lined with black. Dorsal hairs at base pale silvery slate-grey, darkening above to black on the middle third, then subterminally ringed with buffy white, the tips black. In *L. æthiopicus* the base is whiter and less slaty and takes a sandy tone below the black ring, and the sub-terminal light ring is a strange sandy buffy. Flanks markedly greyer and less sandy than in *L. æthiopicus*. Under surface white, the usual collar pale isabelline. Face like back, though less heavily grizzled; ante- and postorbital light markings as usual. A white frontal spot present. Anterior part of back of ears greyish isabelline, the long hairs at its edge sandy buffy for three fourths the length; tips black behind for the terminal half-inch, the marginal hairs also black, though partly hidden by the sandy hairs of the inner side of the edge. In *L. æthiopicus* there is scarcely any black behind the tip of the ear. In length the ears appear to be decidedly shorter than in *L. æthiopicus*. Nape-patch comparatively small, dull sandy, markedly smaller and less vividly sandy than in the allied species. Tail black above, edged with buffy, white on sides and below. Front of fore limbs and hind limbs to ankles pale greyish; upper surface of hind feet whitish.

Skull very much as in *L. æthiopicus*, the occipital shelf rather narrower. Enamel of upper incisors making a deep but simple V-shaped projection into the tooth.

Dimensions of the type (measured in the flesh):—

Head and body 410 millim.; tail 60; hind foot 96; ear 100.

Skull: greatest length 80; basilar length 62; greatest breadth 39; nasals 34 (diagonally)  $\times$  17.5; interorbital breadth 17.2; diastema 22.

This hare is no doubt the southern representative of *L. æthiopicus*, Ehr., of which some excellent examples from Shendy have been recently presented to the Museum by the Hon. N. C. Rothschild. The one from the sandy country

north of Khartoum is naturally sandy in tone, while that from the more marshy region southwards is greyer.

An immature hare from Gerazi, near Khartoum, collected by Mr. H. F. Witherby, also appears to be *L. Hawkeri*, but is too young to be certainly determinable.

Heuglin's *L. microtis*, founded on a young specimen, is a still more southern form from the forest-region about 7° N. by 30° E. It is a strong-coloured forest type of hare, and has apparently nothing to do with the open-country hares of the *L. athiopicus* and *Hawkeri* group.

XXXIX.—*A List of Lepidoptera collected by Mr. Ewart S. Grogan in Central Africa.* By EMILY MARY SHARPE.

DR. SCLATER has placed in my hands the collection of Lepidoptera formed by Mr. Ewart S. Grogan during his celebrated journey through Africa from the Cape to Cairo\*.

The bulk of this collection was obtained in the Karonga district, to the north of Lake Nyasa, and on the Rusisi River, which flows into the north of Lake Tanganyika. One or two specimens were procured in the Mushari country, between Lake Kivu and the Albert Edward Nyanza, and these species are apparently undescribed.

Throughout this paper I have referred to Prof. Aurivillius's 'Rhopalocera Æthiopica,' and when the nomenclature differs from this standard work, it will be understood that the identifications have been made from the specimens in the National Collection as recently arranged by Dr. Butler, Mr. F. A. Heron, and Sir George Hampson.

Family Danaididæ.

1 *Tirumala Petiverana*.

*Danaiida limniace*, var. *Petiverana* (Doubl.); Aurivillius, *Rhopalocera Æthiopica*, p. 33 (1898).

a, b. ♂. River Longwe, Karonga. January.

c. ♂. Volcanoes, 7000 feet. June.

2. *Amauris Grogani*, sp. n.

Allied to *A. damocles*, Beauv., as regards the situation of the white spots on the primaries, but in general appearance resembling *Amauris Ansoni*, Sharpe.

*Primaries*. Ground-colour dark brownish black, relieved

\* See 'Geographical Journal,' vol. xvi. 2, pp. 164-184 (1900).

by a number of white spots as in *A. damocles*; the white spot between the first and second median nervule not extending so far as in the last-named species; all the spots somewhat smaller in size than in *A. damocles*.

*Secondaries* with more than half the wing brownish black; the basal area pale ochre; near the hind margin a row of nearly obsolete whitish spots, those near the apical area being the most strongly marked.

*Underside*. Central area of the primaries dark brownish black, the apical area lighter brown; all the white spots distinctly marked, but much reduced in size when compared with those of *A. damocles*. *Secondaries* with more than half the wing light brown, the basal area pale ochre-yellow; the extreme base dark brown, this colour extending along the costal margin; near the hind margin a distinct row of white spots, varying in size and situated between the nervules; on the extreme edge a row of minute white twin-spots.

♂. Expanse 4.1 inches.

*Hab.* Mushari, 8000 feet. June.

This species may be considered one of the many forms belonging to the groups of *A. damocles* and *A. echeria*, but it is one of the most pronounced and distinct of all the races which a certain school of entomologists unite under one heading, ignoring the fact that differences of coloration are accompanied by a separate and distinct geographical distribution.

### 3. *Amauris Bumilleri*.

*Amauris ochleides*, var. *Bumilleri*, Staud.; Aurivillius, *t. c.* p. 33 (1898).

a. ♂. River Longwe, Karonga. January.

## Family Satyridæ.

### 4. *Gnophodes Grogani*, sp. n.

Allied to *G. parmeno*, Doubl. & Hewits., but at once distinguished by the large dark band on the primaries.

*Primaries*. Ground-colour rich brown, with a distinct transverse band of dull ochreous yellow near the apical area; this band broadest on the costal margin and gradually diminishing along the hind margin; a large dark brown band above the sub-median nervure, extending into the cell. The outline of the wings is more rounded than in *G. parmeno*, especially as regards the primaries.

*Secondaries*. Entirely rich brown, with a pale fulvous line indicated along the hind margin.

*Underside*. Very similar to that of *G. parmeno*, but with the



whole aspect of the primaries darker, the lighter bands having a faint shading of mauve; the small spots near the apex yellow.

*Secondaries.* Much duller than in *G. parmeno*, the characteristic streak along the costal margin darker; the hind-marginal row of spots yellow instead of white; a distinct shading of mauve apparent on the inner margin.

Expanse 2.9 inches.

*Hab.* Mushari, 8000 feet. June.

5. *Physcæneura pione*.

*Physcæneura pione*, Godman; Aurivillius, *t. c.* p. 69 (1898).

*a.* Karonga. January.

6. *Ypthima pupillaris*.

*Ypthima pupillaris*, Butler; Aurivillius, *t. c.* p. 78 (1898).

*a.* Karonga. January.

Family *Acræidæ*.

7. *Acræa balbina*.

*Acræa insignis*, Distant (part.); Aurivillius, *t. c.* p. 89 (1898).

*a.* Karonga. January.

8. *Acræa zetes*.

*Acræa zetes* (Linn.); Aurivillius, *t. c.* p. 90 (1898).

*a.* ♂. Karonga. January.

9. *Acræa Doubledayi*.

*Acræa Doubledayi*, Guérin; Aurivillius, *t. c.* p. 99 (1898).

*a, b.* ♂ ♀. Karonga. January.

10. *Acræa egina*.

*Acræa egina* (Cramer); Aurivillius, *t. c.* p. 92 (1898).

*a.* ♂. Rusisi River, 3600 feet. May.

This specimen shows some red internervular streaks on the primaries; it is in perfect condition, and I imagine that these streaks are only seen when the butterfly is not abraded.

11. *Acræa natalica*.

*Acræa natalica*, Boisduval; Aurivillius, *t. c.* p. 100 (1898).

*a.* ♀. Karonga. January.

12. *Acræa perrupta*.

*Acræa terpsichore* (Linn.); Aurivillius (part.), *t. c.* p. 104 (1898).

*a, b.* ♂ ♀. Karonga. January.

13. *Acræa vinidia*.

*Acræa vinidia*, Hewits.; Aurivillius, *t. c.* p. 105 (1898).

a. Karonga. January.

b. Rusisi Valley, 3300 feet. May.

14. *Acræa दौरα*.

*Acræa encedon* (Linn.); Aurivillius (part.), *t. c.* p. 110 (1898).

a. Rusisi Valley, 3300 feet. May.

Family *Nymphalidæ*.

15. *Precis boopis*.

*Precis orithya* (Linn.); Aurivillius (part.), *t. c.* p. 135 (1898).

a-e. ♂. Karonga. January.

f-h. ♀. Karonga. January.

i. ♀. Rusisi Valley, 3300 feet. May.

16. *Precis cebrene*.

*Precis ænone* (Linn.); Aurivillius (part.), *t. c.* p. 135 (1898).

a. ♂. Karonga. January.

17. *Precis Trimeni*.

*Precis Trimeni*, Butler; Aurivillius, *t. c.* p. 137 (1898).

a. Karonga. January.

18. *Precis elgiva*.

*Precis terea*, var. *elgiva* (Drury); Aurivillius, *t. c.* p. 141 (1898).

a. Karonga. January.

19. *Precis artaxia*.

*Precis artaxia*, Hewits.; Aurivillius, *t. c.* p. 143 (1898).

a, b. Plateau Chamba. January.

20. *Hypolimnas mima*.

*Hypolimnas dubius*, Palisot, var. (et ab.) *mima*, Aurivillius, *t. c.* p. 149 (1898).

a. Karonga. January.

21. *Eurytela dryope*.

*Eurytela dryope* (Cramer); Aurivillius, *t. c.* p. 154 (1898).

a, b. Rusisi Valley, 3300 feet. May.

22. *Neptidopsis velleda*.

*Neptidopsis ophione* (Cramer), var. *velleda*, Aurivillius, *t. c.* p. 156 (1898).

a. Karonga. January.

23. *Ergolis enotrea*.*Ergolis enotrea* (Cramer); Aurivillius, *t. c.* p. 156 (1898).*a, b.* Rusisi Valley, 3300 feet. May.24. *Crenis rosa*.*Crenis rosa*, Hewits.; Aurivillius, *t. c.* p. 161 (1898).*a-f.* ♂. Karonga. January.*g-j.* ♀. Karonga. January.25. *Neptis saclava*.*Neptis saclava*, Boisduval; Aurivillius, *t. c.* p. 166 (1898).*a.* Rusisi Valley, 3300 feet. May.26. *Neptis agatha*.*Neptis agatha*, Stoll; Aurivillius, *t. c.* p. 167 (1898).*a.* Rusisi Valley, 3300 feet. May.27. *Ham anumida dædalus*.*Ham anumida dædalus* (Fabricius); Aurivillius, *t. c.* p. 181 (1898).*a.* Karonga. January.28. *Charaxes Guderiana*.*Charaxes Guderiana*, Dewitz; Aurivillius, *t. c.* p. 238 (1898).*a.* Karonga. January.29. *Charaxes argynnides*.*Charaxes juhliana*, Trimen, var. *argynnides* (Westw.); Aurivillius, *t. c.* p. 240 (1898).*a.* Rusisi River, 3600 feet. May.

## Family Lycænidae.

30. *Teriomima Hildegarda*.*Teriomima Hildegarda*, Kirby; Aurivillius, *t. c.* p. 271 (1898).*a.* Karonga. January.31. *Virachola antalus*.*Deudorix antalus*, Hopffer; Aurivillius, *t. c.* p. 309 (1898).*a.* Karonga. January.32. *Hypolycæna philippus*.*Hypolycæna philippus*, Fabricius; Aurivillius, *t. c.* p. 316 (1898).*a, b.* ♀. Karonga. January.33. *Hypolycæna cæculus*.*Hypolycæna cæculus*, Hopffer; Aurivillius, *t. c.* p. 316 (1898).*a, b.* ♂ ♀. Karonga. January.

34. *Axiocerses harpax*.

*Axiocerses harpax*, Fabricius; Aurivillius, *t. c.* p. 335 (1898).

a. Karonga. January.

35. *Cacyreus linzeus*.

*Cupido linzeus*, Cramer; Aurivillius, *t. c.* p. 360 (1898).

a. ♀. Karonga. January.

36. *Polyommatus bæticus*.

*Cupido bæticus*, Linn.; Aurivillius, *t. c.* p. 367 (1898).

a. ♂. Karonga. January.

37. *Catochrysops asopus*.

*Cupido malathana*, Boisduval (part.); Aurivillius, *t. c.* p. 373 (1898).

a. ♀. Karonga. January.

38. *Catochrysops peculiaris*.

*Cupido peculiaris*, Rogenhofer; Aurivillius, *t. c.* p. 378 (1898).

a. ♀. Karonga. January.

Family Pieridæ.

39. *Belenois mesentina*.

*Pieris mesentina* (Cramer); Aurivillius, *t. c.* p. 407 (1898).

a. ♂. Plateau Chamba. January.

40. *Belenois instabilis*.

*Pieris subeida*, Felder; Aurivillius (part.), *t. c.* p. 408 (1898).

a. ♂. Rusisi Valley, 3300 feet. May.

41. *Belenois dentigera*.

*Pieris dentigera*, Butler; Aurivillius, *t. c.* p. 409 (1898).

a. ♂. Rusisi Valley, 3300 feet. May.

42. *Teracolus ocale*.

*Teracolus evippe* (Linn.), var. (ab.?) *ocale*, Boisd.; Aurivillius, *t. c.* p. 433 (1898).

a. ♂. Rusisi Valley, 3300 feet. May.

43. *Teracolus gavis*.

*Teracolus achine* (Cramer), var. *æstiv. extrema gavis*, Wallengr.; Aurivillius, *t. c.* p. 436 (1898).

a. ♀. Rusisi Valley, 3300 feet. May.

44. *Terias senegalensis*.

*Terias senegalensis*, Boisd.; Aurivillius, *t. c.* p. 451 (1898).

a. Rusisi Valley, 3300 feet. May.



Family **Papilionidæ.**45. *Papilio Mackinnoni*.*Papilio Mackinnoni*, E. M. Sharpe; Aurivillius, *t. c.* p. 472 (1898).*a.* Volcanoes, Mfumbiro district, 7000 feet. June.46. *Papilio nireus*.*Papilio nireus*, Linn.; Aurivillius, *t. c.* p. 475 (1898).*a, b.* Rusisi River, 3600 feet. May.47. *Papilio demodocus*.*Papilio demodocus*, Esper; Aurivillius, *t. c.* p. 477 (1898).*a, b.* Karonga. January.Family **Hesperiidæ.**48. *Rhopalocampta forestan*.*Rhopalocampta forestan* (Cramer); Holland, P. Z. S. 1896, p. 98.*a, b.* Rusisi Valley, 3300 feet. May.

## H E T E R O C E R A.

Family **Sphingidæ.**49. *Chærocampa celerio*.*Theretra celerio* (Linn.), Kirby, Lepid. Heterocera, i. p. 652 (1892).*a.* Karonga. January.Family **Limacodidæ.**50. *Chrysopoloma polana*.*Cosuma polana*, Druce, P. Z. S. 1887, p. 682, pl. lv. fig. 8.

Karonga. January.

Family **Noctuidæ.**51. *Ophideres fullonica*.*Ophideres fullonica* (Linn.); Hamps., Fauna Brit. India, Moths, ii. p. 560 (1894).*a.* North end, Tanganyika. April.52. *Argadesa materna*.*Ophideres materna* (Linn.); Butler, P. Z. S. 1888, p. 84.*a.* Karonga. January.53. *Remigia archesia*.*Remigia archesia* (Cram.); Butler, P. Z. S. 1893, p. 682.*a.* Rusisi River, 3500 feet. May.

54. *Hypocala Moorei*.

*Hypocala Moorei*, Butl.; Hamps., Fauna Brit. India, Moths, ii. p. 454 (1894).

a. Chosi River. February.

55. *Azazia rubricans*.

*Azazia rubricans* (Boisd.); Butler, P. Z. S. 1887, p. 574.

a. Ikomba. February.

56. *Plusia eriosoma*.

*Plusia eriosoma*, Doubl.; Butler, P. Z. S. 1898, p. 424.

a. Ikomba. February.

57. *Eutelia* sp.

a. Longwe, Karonga. January.

Family Agaristidæ.

58. *Xanthospilopteryx superba*.

*Eusemia superba*, Butler, P. Z. S. 1893, p. 674.

a, b. Karonga. January.

59. *Pristoceraa alba*.

*Pristoceraa alba*, Rothschild, Nov. Zool. iv. p. 183 (1897).

a. Karonga. January.

Family Arctiidæ.

60. *Acantharctia flavicosta*.

*Amsacta flavicosta*, Hampson, Annals of the South-African Museum, ii. p. 53 (1900).

a. Karonga. January.

Family Hypsidæ.

61. *Nyctemera leuconoe*.

*Leptosoma leuconoe* (Hopff.); Butler, P. Z. S. 1893, p. 678.

a. Rusisi Valley, 3300 feet. May.

Family Geometridæ.

62. *Gonodela amandata*.

*Macaria amandata*, Walker, Cat. Lepid. Heter., Geom. xxiii. p. 922 (1861).

a. Rusisi Valley, 3500 feet. May.

63. *Gonodela brongusaria*.

*Gonodela brongusaria* (Walk.); Butler, P. Z. S. 1893, p. 683.

a. Rusisi Valley, 3500 feet. May.

64. *Nemoria unilinea*.*Nemoria unilinea*, Warren, Nov. Zool. v. p. 235 (1898).

a. Rusisi Valley, 3000 feet. May.

## Family Pyralidæ.

65. *Filodes costivitalis*.*Filodes costivitalis*, Guen. Réunion, p. 65.

a. Ikomba. February.

## Family Crambidæ.

66. *Crambus carpherus*.*Crambus carpherus*, Hampson, Ann. & Mag. Nat. Hist. (7) i. p. 159 (1898).

a. Karonga. January.

XL. — *Further Notes on the Pangoninæ of the Family Tabanidæ in the British Museum Collection.* By Miss GERTRUDE RICARDO.

For an alphabetical catalogue of the whole family of Tabanidæ the one published by Dr. Kertész, of Budapest, January 1900, will be found very useful.

Those species marked with an asterisk (\*) are in the British Museum Collection. As regards the Bigot types, I am indebted to Mr. Verrall for his courtesy in lending them to me for examination.

*Silvius* and its allied genera are dealt with in this paper, as a continuation of that on *Pangonia*, Latr., and its allied genera in Ann. & Mag. Nat. Hist. (7) v. p. 97 (1900).

*Scepsis*, Walker, Dipt. Saund. i. p. 71 (1850), should have been included in the first paper and would follow at the end of the table as:—

13 a. First joint of palpus thickened ..... *Scepsis*, Walk.

\**Scepsis nivalis*, Walker, l. c. pl. ii. fig. 7; Loew, Dipt. Südafrik. p. 15 (1860).

## South America.

The type in the British Museum Collection is a female, with the antennæ wanting, but they are well figured in the plate, though the spines present on the hind tibiæ are omitted. The type is labelled South America, 68. 4 (*Saunders Coll.*).

Among the Walker types of *Chrysops* I found what I believe is a specimen of *Apocampta nigra*, Schiner, a genus belonging to the *Pangonia* group and included in the table in Ann. & Mag. Nat. Hist. (7) v. p. 98 (1900).

APOCAMPTA, Schiner.

*Apocampta*, Schiner, Reise Novara, p. 96 (1866).

\**Apocampta subcanus*, ♀, Walker, List Dipt. pt. i. p. 204 (1848) (*Chrysops*).

*A. nigra*, ♀, Schiner, Reise Novara, p. 96 (1866).

The type (female) from Australia proved on examination to be not a *Chrysops*, but apparently identical with Schiner's species, as did also another female from Mackay, Queensland, 94. 61 (Turner).

They agree with the description given by Schiner, but the abdomen is not so broad in the second female. Schiner describes the second joint of the antennæ as ending in a bristle ("Dorn"); in these the joint is small, with a ring of fine bristles, and black hair on the sides; the palpi have the first joint cylindrical, the second wider at its base, curved, and tapering to a point; the thorax is brownish with three black obscure stripes.

PANGONINÆ.

Hind tibiæ with spurs. Ocelli usually present.

Third joint of antennæ with five divisions. Proboscis

short ..... *Silvius*, &c.

The genera comprised in this division of the Pangoninæ are:—*Sylvius*, Meig., *Rhinomyza*, Wiedem., *Gastroxides*, Saunders, *Pronopes*, Loew, and *Chrysops*, Meig., with *Esenbeckia*, Rondani, a subgenus formed from *Silvius*.

Attempts have been made to subdivide *Silvius*, creating new subgenera, which Loew in his Dipt. Südafrik. considers unnecessary owing to the few known species of *Silvius*; *Esenbeckia* is the only subgenus left to stand for the present.

*Mesomyia*, Macq., created for *M. decora*, from Natal, by Macquart (Dipt. Exot. Suppl. 4, p. 38, 1850), both Loew and Schiner agree must be merged again in *Silvius*; the former considers *M. decora* is the same as his *Silvius decipiens*, but Macquart's description is too meagre for him to form a definite opinion (see Dipt. Südafrik. p. 15).

*Ectenopsis*, Macq. (Dipt. Exot. i. p. 111, 1838), formed for *Chrysops vulpecula*, Wiedem., the above authorities also



agree must be sunk in *Silvius* (see Schiner, Reise der Novara; Loew, Dipt. Südafrik.), the species becoming *Silvius vulpecula*.

*Rhinomyza*, Wiedem. (Dipt. Exot. i. p. 29, 1821), is looked upon by Loew as a doubtful genus, the only character which divides it from *Silvius* being the greater deepening of the face in the centre; he leaves it standing for the present, adding a new species and suggesting that *Silvius denticornis*, Wiedem., should belong to it.

*Erodiorhynchus*, Macq. (Dipt. Exot. i. p. 110, 1838), formed for *E. eristaloides*, Macq., is a synonym of *Rhinomyza edentula*, Wiedem., according to Loew, whose remarks on this and the above genus do not agree with those of Schiner ('Reise der Novara'); but Loew is followed here, as being probably most correct, Schiner's remarks on *Rhinomyza* being clearly wrong. The latter makes a new species, *Erodiorhynchus pusillus*, which should perhaps belong to *Silvius*, or more probably to *Rhinomyza*, though he does not mention the face as being concave in the centre, as it should be, if belonging to *Rhinomyza*.

Macquart's description of the genus is most inadequate and seems to give no characters which would distinguish it from *Silvius* or *Rhinomyza*; it is therefore not maintained in this paper, but merged again in *Rhinomyza* for the present.

Rondani (Archiv. Canestr. iii. p. 85, 1863) subdivides *Silvius*, creating two subgenera, and taking the hairiness or nakedness of the eyes and the closed or open posterior cell as characters on which to found them, viz.: *Veprius* for those species of *Silvius* with hairy eyes, leaving those with naked eyes in *Silvius*. It does not seem worth while to retain this subgenus. *Esenbeckia* he establishes for two species from Brazil and Chili, which have the first posterior cell of the wings closed, a characteristic peculiar to them alone, I believe, so that for the present this subgenus may be allowed to stand.

*Gastroxides*, Saunders, and *Pronopes*, Loew, were each formed for one species.

Rondani established the genus *Nemorius* (Prodrome Dipt. Ital. i. p. 171, 1856) for *Chrysops vitripennis*, Meig., a species with clear wings, and differing somewhat from the other European species, as Loew remarks in Dipt. Südafrik. p. 16: see also Verh. zool.-bot. Gesell. Wien, viii. p. 616 (1858), where he regards it as unnecessary to separate it from *Chrysops*; I have therefore not included the genus *Nemorius* in the following table of genera:—

PANGONINÆ.

Third joint of antennæ with five divisions. Proboscis short.

[See first part of the table of genera in Ann. & Mag. Nat. Hist. (7) v. p. 98 (1900).]

- |  |                            |
|--|----------------------------|
| 14. First and second joints of antennæ short ..                                | 15.                        |
| First and second joints of antennæ long ..                                     | 20.                        |
| 15. Second segment of abdomen unusually large, spurs on tibiæ small .....      | <i>Pronopes</i> , Loew.    |
| Second segment of abdomen not unusually large, spurs not unusually small ..... | 16.                        |
| 16. Face concave in the middle .....   | <i>Rhinomyza</i> , Wiedem. |
| Face not concave in the middle .....   | 17.                        |

SILVIUS, Meig.

- |  |                                |
|--|--------------------------------|
| 17. Wings with first posterior cell open .....   | <i>Silvius</i> , Rond.         |
| 18. Wings with first posterior cell closed ....  | Subgenus <i>Esenbeckia</i> ,   |
| 19. Third joint of antennæ with an acute spine on the first annulation .....   | [Rond.                         |
| Third joint of antennæ with no spine on the first annulation .....   | <i>Gastroxides</i> , Saunders. |
| 20. Second joint of antennæ as long or nearly as long as the first joint. Wings usually with a black or brown design ..... | 20.                            |
|  | <i>Chrysops</i> , Meig.        |

PRONOPES, Loew.

*Pronopes*, Loew, Dipt. Südafrik. p. 27, pl. i. figs. 12, 13, 15, 16, 17 (1860).

This genus was formed for one species, *P. nigricans*, from the Cape of Good Hope, which is not represented in the British Museum Collection. The correct numbering of the figures in plate is as above and not as given in the work itself.

RHINOMYZA, Wiedem.

*Rhinomyza*, Wiedem., Nova Dipt. Gen. p. 8 (1820); id. Dipt. Exot. i. p. 59 (1821); Loew, Dipt. Südafrik. p. 15 (1860); Schiner, Reise Novara, p. 97 (1866).

*Erodiorhynchus*, Macq., Dipt. Exot. i. p. 110 (1838).

The described species of *Rhinomyza*, including the two species of *Erodiorhynchus* and one transferred from *Silvius*, are :—

- R. fusca*, ♀, Wiedem., Nova Dipt. Gen. p. 8 (1820); id. Dipt. Exot. i. p. 59 (1821); id. Auss. zweifl. Ins. i. p. 104, pl. i. fig. 3 (1828); Henning Jensen, Bull. Soc. Imp. Nat. Moscou, iv. p. 313 (1832); Macq., Hist. Nat. Dipt. i. p. 196 (1834); Walker, List Dipt. pt. v. Suppl. 1, p. 146 (1854); Bigot, Cat. Orient. Dipt. (1891); Wulp, Cat. Dipt. S. Asia (1896).—Java.
- R. edentula*, ♂, Wiedem., Auss. zweifl. Ins. i. p. 105 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 146 (1854); Loew, Dipt. Südafrik.

pp. 15, 26 (1860); Schiner, Reise Novara, p. 97 (1866). [*Erodiorhynchus eristoloides*, Macq., Dipt. Exot. i. p. 111, pl. vi. fig. 1 (1838); Walker, List Dipt. v. Suppl. 1, p. 146 (1854).]—Cape of Good Hope.

\**R. denticornis*, ♂ ♀, Wiedem., Auss. zweifl. Ins. i. p. 111 (1828); Walker, List Dipt. pt. i. p. 192 (1848), pt. v. Suppl. 1, p. 275 (1854) (*Silvius*); Loew, Dipt. Südafrik. pp. 21, 26 (1860); Ricardo, Ann. & Mag. Nat. Hist. (7) vi. p. 163 (1900). [*Dichelacera binotata*, ♂ ♀, Macq., Dipt. Exot. i. p. 113 (1838); Schiner, Reise Novara, p. 97 (1866).]—Cape of Good Hope.

*R. costata*, ♂, Loew, Dipt. Südafrik. p. 26 (1860).—Cape of Good Hope.

*R. pusilla*, ♂ ♀, Schiner, Reise Novara, p. 97 (1860) (*Erodiorhynchus*).—Cape of Good Hope.

#### RHINOMYZA, Wiedem.

The third joint of antennæ with a long tooth-like projection ..... 1.

The third joint of antennæ with no tooth-like projection ..... 4.

1. Black, shining. Eyes hairy..... *costata*, ♂, Loew.
2. Brown. Legs blackish brown..... *fusca*, ♀, Wiedem.
3. Yellow. Legs yellow. Eyes bare..... *denticornis*, ♂ ♀, Wiedem.
4. Black, shining. Legs black and brown .. *edentula*, ♂, Wiedem.
5. Blackish brown. Legs reddish yellow.  
Abdomen with white bands on posterior  
borders of segments. Eyes hairy..... *pusilla*, ♂ ♀, Schiner.

The antennæ in the type of *costata* were defective, so that it is only placed under those species with a tooth-like projection of the third joint of antennæ on supposition. The species *pusilla* is placed under *Rhinomyza*, but may prove to belong more correctly to the genus *Silvius*.

#### *Rhinomyza denticornis*, Wiedem.

Three males and six females from Natal.

#### SILVIUS, Meigen.

*Silvius*, Meigen, Syst. Besch. iii. p. 27 (1820); Loew, Dipt. Südafrik. pp. 15, 21 (1860); Schiner, Reise Novara, p. 97 (1866).

*Mesomyia*, Macq., Dipt. Exot. Suppl. 4, p. 38 (1850).

*Ectenopsis*, Macq., Dipt. Exot. i. p. 111 (1838).

*Veprius*, Rond., Archiv. Canestr. iii. p. 18 (1863).

Loew, in his Dipt. Südafrik., should be consulted for the characters of this genus, the species of which are not very numerous.

Owing to want of material, the tables of the species have been drawn up in great part from the descriptions and are only published in the hope that they may be of some use in the identification of species, and may soon be replaced by others based on the examination of the species themselves.

In the following tables I have assumed the antennæ are simple, with no tooth or angle, when there is no express mention of such a tooth or angle in the description; the eyes in all the species not expressly mentioned as hairy are assumed to be bare.

*Palæarctic Region.*

The description of *S. dorsalis*, by Coquillett, seems to point to its being very nearly related to *S. vituli*, Fabr.

For the species from this region Loew's paper in the Wien. ent. Monat. ii. p. 350 (1858) should be consulted.

- \**S. vituli*, ♂ ♀, Fabr., Syst. Antl. p. 97 (1805); Meig., Klass. i. p. 172 (1804); id. Syst. Besch. ii. p. 27 (1820); Loew, Wien. ent. Monat. ii. p. 350 (1858); Gobert, Rev. Monogr. d. Tabanidæ, Mém. Soc. Nord France, l. p. 45 (1883). [*? Tabanus italicus*, Fabr., Spec. Ins. ii. p. 457 (1781). *Tabanus decisis*, Walker, List Dipt. pt. i. p. 171 (1848); id. pt. v. Suppl. 1, p. 274 (1854).]—Europe.
- S. alpinus*, ♀, Drapiez, Ann. Génér. d. Sc. Phys. p. 136, pl. vii. fig. 7 (1819) (*Tabanus*); Bergroth, Ent. Nachr. xiii. p. 150 (1887). [*S. hirtus*, ♂, Loew, Wien. ent. Monat. ii. p. 350 (1858); Bergroth, l. c. p. 151.]—Alps.
- S. algirus*, ♂, Meig., Syst. Besch. vi. p. 319 (1830); Macq., Hist. Nat. Dipt. i. p. 214 (1835); Lucas, Explor. Sci. Alg. iii. p. 427 (1849); Walker, List Dipt. pt. v. Suppl. 1, p. 275 (1854); Loew, Wien. ent. Monat. ii. p. 350 (1858). [*? Tabanus italicus*, Fabr., Spec. Ins. ii. p. 457 (1781); see Loew, Wien. ent. Monat. ii. p. 350 (1858).]—Algeria, S. Europe.
- S. appendiculatus*, ♂, Macq., Dipt. Exot. Suppl. 1, p. 45, pl. iv. fig. 10 (1846); Lucas, Explor. Sci. Alg. iii. p. 426 (1849); Walker, List Dipt. pt. v. Suppl. 1, p. 275 (1854); Schiner, Reise Novara, p. 97 (1866).—Algeria, Europe.
- S. ochraceus*, ♀, Loew, Wien. ent. Monat. ii. p. 351 (1858).—Mermeriza, Asia Minor.
- S. bicolor*, ♀, Bigot, Mém. Soc. Zool. France, v. p. 625 (1892).—Morocco.
- S. dorsalis*, ♀, Coquillett, Proc. U. States Mus. xxi. p. 309 (1898).—Japan.
- \**S. irritans*, ♀, sp. n.—Hari-rud Valley and Khorasan, Afghanistan.

1. The third joint of antennæ simple, without a tooth or projecting angle.
2. Abdomen with spots . . . . . 3.
- Abdomen with no spots . . . . . 4.
3. Reddish yellow. Abdomen with four whitish-yellow spots . . . . . *algirus*, ♂, Meig.
- Yellowish. Abdomen yellow with triangular grey dorsal spots . . . . . *appendiculatus*, ♂, Macq.
4. Yellow. Abdomen brownish yellow with a yellowish central stripe. Thorax and scutellum black . . . . . *bicolor*, ♀, Bigot.
5. Yellow. The pubescence on the first two joints of the antennæ and on the anterior border of the abdominal segments black. *vituli*, ♂ ♀, Fabr.



6. Yellow. Abdomen brownish yellow, browner on the posterior segments; the black pubescence more widely distributed than in *vituli*. . . . . *alpinus*, ♀, Drap.
7. Yellow. Pubescence as in *vituli*. Thorax with three brown-grey pruinose vittæ. Scutellum yellow. . . . . *dorsalis*, ♀, Coquillet.
8. Yellow. Abdomen yellow. Pubescence wholly yellow on the antennal joints and on the abdomen . . . . . *ochraceus*, ♀, Loew.
9. Grey. Abdomen black with reddish-yellow bands. Eyes bare. Legs yellowish. *irritans*, ♀, sp. n.

*Silvius vituli*, ♂ ♀, Fabr.

One female from Polish Ukraine, 387. 43. 57 (*Dowler Coll.*), which was named *Tabanus decisus* by Walker; it is clearly identical with *S. vituli*, Fabr. Walker's name must therefore sink.

*Silvius bicolor*, ♀, Bigot.

Having examined the type I think this species is very probably the female of *S. algirus*, Macq. The abdomen is brownish yellow with a light yellowish stripe in the centre, formed of indistinct triangular spots, most distinct from the third to the sixth segment. The first two joints of the antennæ have black pubescence. The wings have an appendix.

*Silvius irritans*, ♀, sp. n. See Trans. Linn. Soc. London, (2) v. p. 133 (1889).

Eight females from Hari-rud Valley and Khorasan, mentioned in the above 'Transactions,' with the following note by Dr. Aitchison, the collector on the Afghan Boundary Commission:—

"Near Mt. Do Shakh my ponies were nearly driven mad with the numbers of this very small species; although in ones or twos they did not give much trouble, when in large numbers, as I saw them, they were extremely irritating to the cattle, chiefly attacking the head and fore legs."—J. E. T. A.

The species does not seem to have been previously described.

Grey. Antennæ with the third joint simple; reddish, grey at apex of first and second joints, the third joint black except at its base, the space around the antennæ reddish. Face grey, with a black shining spot in the middle of the forehead above the antennæ; the ocelli are placed on a small

tubercle which rises out of a triangular depression; there are also two black shining spots each side of the antennæ; the cheeks are finely punctured, with a longitudinal furrow ending in a cavity; there is some slight light-coloured pubescence on the face. Palpi greyish yellow, rather large, broad at base, tapering to a point; the first joint is short, the second has a longitudinal furrow. Beard grey. Proboscis as long as head. Eyes bare. Abdomen with the first two segments largely reddish yellow, with a black dorsal stripe, the remaining segments are black, the posterior borders yellow; in some of the specimens the yellow border is wider than in the others. Legs yellow, with the apex of the posterior femora, the base of the fore tibiæ and the tarsi black; the posterior tarsi are yellow with the apex of the joints darker. Halteres whitish. Wings hyaline, with pale yellow veins. Length  $6\frac{1}{2}$  millim.

The spurs on the hind tibiæ in this species are small and easily overlooked.

Type A. 20. 89. 65.

#### Nearctic Region.

\**S. gigantulus*, ♀, Loew, Centur. x. p. 12 (1861); id. Berlin. ent. Zeit. xvi. p. 57 (1872) (*Chrysops*); Osten Sacken, Western Diptera, p. 215 (1877); id. Cat. N. Amer. Dipt. note 70 (1878). [*Silvius trifolium*, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 395 (1876).]—California, British Columbia.

*S. pollinosus*, ♀, Williston, Trans. Conn. Ac. iv. p. 244 (1882); id. Trans. Kansas Acad. x. p. 131 (1887).—N. America.

1. Third joint of antennæ simple . . . . . 2.
2. Yellow. Wings hyaline and non-pubescent. . . . . *gigantulus*, Loew.
3. Black, with greyish-white tomentum. Wings  
pubescent, clouded and spotted. . . . . *pollinosus*, Williston.

#### *Silvius gigantulus*, Loew.

Nine females from Chulukweyah Trail, British Columbia, August 1859.

#### Neotropical Region.

*S. Sylveirii*, ♀, Macq., Dipt. Exot. i. p. 155, pl. xix. fig. 1 (1838); Walker, List Dipt. pt. v. Suppl. 1, p. 275 (1854).—(Called *marginatus* in Macquart's plate, evidently a misprint).—Brazil.

*S. rufipes*, ♀, Macq., Dipt. Exot. Suppl. 4, p. 37 (1850).—Brazil.

*S. nubipennis*, ♀, Rondani, Nuovi Ann. del Sci. Nat. Bologna, (3) ii. p. 371 (1850).—(This is evidently a female by the description, though not expressly mentioned).—Equatorial America.

*S. presbiter*, ♂, Rondani, Archivio Canestrini, iii. p. 84 (1863); id. Ann. Soc. Nat. Modena, iii. p. 84 (1866) (*Veprius*).—St. Jago, S. America.

*S. rufopilosus*, ♂, Bigot, Mém. Soc. Zool. Fr. v. p. 620 (1892) (*Veprius*).—Chili.

1. Third joint of antennæ simple, without a tooth or projecting angle.
2. Black species ..... 3.  
Yellow species ..... 6.
3. Legs blackish ..... 4.  
Legs yellowish ..... 5.
4. Abdomen with three white bands. Legs black and white. Wings clear, darker on the fore-border ..... *Sylveirii*, ♀, Macq.  
Legs black. Wings dark..... *presbiter*, ♂, Rond.
5. Abdomen with the incisions of the segments yellow. Wings hyaline. Antennæ reddish. *rufipes*, ♀, Macq.  
Abdomen with greyish-yellow pubescence. Wings hyaline. Antennæ black ..... *rufopilosus*, ♂, Bigot.
6. Legs reddish yellow and black. Wings hyaline with a dark apical spot ..... *nubipennis*, ♀, Rond.

None of the species are represented in the British Museum Collection.

*Silvius rufopilosus*, ♂, Bigot.

The type, a male, and another male specimen are both from Chili.

This is a very hairy species and is apparently nearly related to *S. rufipes*, Macq., but the antennæ are entirely black, whereas Macquart describes his species as having the first two joints red. The abdomen is black with the posterior borders of the segments narrowly fulvous; the yellowish-grey hairs are scattered over the dorsum, but are thickest at the sides. The legs are yellow, the coxæ, the apices of the femora, tibiæ, and tarsi black; the fore femora are also black on their upperside; all the femora have long white hairs on their underside, otherwise the pubescence of the legs is chiefly black and short. Wings clear, yellow on the fore border, veins yellow, with an appendix.

*Ethiopian Region.*

- S. decorus*, ♀, Macq., Dipt. Exot. Suppl. 4, p. 38, pl. ii. fig. 10 (1850) (*Mesomyia*); Loew, Dipt. Südafrik. p. 15 (1860). [*Silvius decipiens*, Loew, *l. c.* p. 25.]—Caffraria, S. Africa.
- S. pertusus*, ♂, Loew, *l. c.* p. 22 (1860).—Caffraria, S. Africa.
- \**S. glandicolor*, ♂, Loew, *l. c.* p. 23, pl. i. figs. 8–10.—Caffraria, S. Africa.
- S. cuneatus*, ♂ ♀, Loew, *l. c.*—Caffraria, S. Africa.
- S. confluentus*, ♀, Loew, *l. c.* p. 24, pl. i. fig. 11 (not fig. 10 as printed in the original work).—Caffraria, S. Africa.
- S. decipiens*, ♀, Loew, *l. c.* pp. 15, 25. [*Silvius decorus*, Macq., *l. c.*]—Caffraria, S. Africa.
- ?*S. æstroides*, ♀, Karsch, Berlin. ent. Zeit. xxxi. p. 371, pl. iv. fig. 6 (1887).—East Africa.
- S. innotatus*, ♀, Karsch, *l. c.* pl. iv. fig. 1.—East Africa.

1. The third joint of antennæ with long tooth-like projection ..... 5.
2. The third joint of antennæ produced to a sharp angle at its base as in *Tabanus* ..... 7.
3. The third joint of antennæ simple, without a tooth or projecting angle ..... 8.
4. Eyes bare ..... 5.  
Eyes hairy ..... 12.
5. Black. Legs bright reddish yellow. Wings dark ..... *pertusus*, ♂, Loew.
6. Yellow. Legs yellow. Wings clear with darker shading ..... *innotatus*, ♀, Karsch.  
*glandicolor*, ♀, Loew.
7. Brown and shining. Legs dull yellow ..... *decorus*, ♀, Macq.
8. Black. Abdomen with white-haired spots. Legs reddish ..... *cuneatus*, ♂ ♀, Loew.
9. Greyish brown, ♂. Pitchy black, ♀. Legs brown and yellow ..... 11.
10. Discoidal cell open ..... 12.
11. Discoidal cell closed ..... 12.
12. Abdomen brownish, with bands. Legs brownish black ..... *confuens*, ♀, Loew.
12. Abdomen dark brick-reddish, with spots .... *decipiens*, ♀, Loew.

Light yellow. Abdomen very long, hind borders of segments darker. Legs yellow. . *æstroides*, ♀, Karsch.

This last species is placed under *Silvius* by Karsch as probably belonging to that genus, but the antennæ were broken off and the eyes are not mentioned, so that it cannot be included in the above table, but is placed last with a short description to aid its identification.

In No. 6 the eyes are not mentioned; it is presumed they are bare.

*Silvius decorus*, Macq., is inserted in the table after Macquart's description and figure, which do not bring it into line with *S. decipiens*, Loew, with which Loew supposes it may be identical.

### *Silvius glandicolor*, ♂, Loew.

One male and one female specimen in poor preservation from Port Natal, 58. 13.

The female has the forehead shining, similar to the species described by Macquart, in Dipt. Exot. i. p. 32, as *Tabanus fallax*, which Loew suggests may be the same as the species he described as *S. glandicolor*, but the colouring of the legs differs in the two species.

### Oriental Region.

*S. dimidiatus*, ♀, Wulp, Tijds. Ent. xi. p. 102, pl. iii. figs. 3-5 (1868); Osten Sacken, Ann. Mus. Civ. Genova, xvi. p. 478 (1880); Bigot, Cat. Orient. Dipt. (1891); Wulp, Cat. Dipt. S. Asia (1896).—Salwatty, E. Indies.



Third joint of antennæ simple, without a tooth  
or projecting angle. Eyes hairy.

1. Pale yellow. Abdomen with posterior segments darker. Wings clouded . . . . . *dimidiatus*, ♀, Wulp.

Osten Sacken (Ann. Mus. Civ. Genova, xvi. p. 478) doubts this species being a true *Silvius*.

### Australian Region.

\**S. marginatus*, ♀, Walker, List Dipt. pt. i. p. 189 (1848) (*Tabanus*).—Port Essington, Australia.

\*? *S. nitescens*, ♂, Walker, Trans. Ent. Soc. London, iv. p. 125 (1857).—Australia.

*S. silvester*, ♀, Bergroth, Ent. Zeit. Stettin, lv. p. 71 (1894).—Central Queensland.

- |   |                                 |
|---|---------------------------------|
| 1. Third joint of antennæ simple, without a tooth or projecting angle . . . . . | 2.                              |
| Third joint of antennæ produced to a sharp angle at the base . . . . .          | 3.                              |
| 2. Grey. Abdomen black and grey with darker spots. Legs black. Wings hyaline.   | <i>silvester</i> , ♀, Bergroth. |
| Grey. Abdomen with marks and spots. Legs tawny . . . . .                        | <i>nitescens</i> , ♂, Walker.   |
| 3. Brown. Legs reddish brown . . . . .  | <i>marginatus</i> , ♀, Walker.  |

The description of *S. silvester* is not very explicit, especially as regards the antennæ, which are only mentioned as having the first annulation of the third joint wider at its base than the others.

There is a large specimen of a female species from New Zealand, 81. 43 (*Shelton*), measuring 15 millim., for which perhaps a new genus may be required; from the form of the antennæ it would belong to *Silvius*, but the extremely stout spines on the hind tibiæ, the rather short wings and long abdomen give it a very different appearance to the majority of *Silvius* species. In colour it is dull black, with grey pubescence, so that the abdomen appears greyish; the wings are hyaline with a short appendix; the legs are short and stout, reddish in colour.

### *Sylvius marginatus*, ♀, Walker.

Two females in poor preservation—the type from N. or N.W. coast of Australia (pres. Haslar Hospital), 44. 4; the other from Port Essington, 42. 1: they were incorrectly placed under *Tabanus* by Walker. The frontal stripe is dark brown; ocelli are present. The palpi are two thirds the length of the proboscis. The antennæ have the first annulation of the third joint broad and large, produced at its base to an angle.

*Silvius nitescens*, ♂, Walker.

The only specimen; the type has lost its abdomen and antennæ, it is therefore impossible to judge if it is really a *Silvius*, it has more the appearance of a *Pangonia*; the spurs on the hind tibiæ are present; it is simply labelled "Australia."

The *Mesomyia maoriorum*, ♂, described by Bigot, in Mém. Soc. Zool. Fr. p. 621 (1892), is exactly similar in appearance to the male specimens of Walker's *Tabanus truncatus*, from New Zealand, in the British Museum Collection, and after careful examination I can find no trace of real spurs on the hind tibiæ; there are also no ocelli, and the markings of the abdomen are typical of the *Tabani*. Mr. Hutton, of Christchurch, New Zealand, informs me he has a female specimen of this species, and remarks, "It agrees in the specific characteristics given by Bigot, but has an oval abdomen and no ocelli, thus differing from *Silvius*." There seems, therefore, no doubt that it must be regarded as a specimen of *T. truncatus*, Walker.

*From unknown Locality.*

*Silvius vulpecula*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 195 (1828); Walker, List Dipt. pt. i. p. 205 (1848); id. pt. v. Suppl. 1, p. 147 (1854) (*Chrysops*); Macq., Dipt. Exot. i. p. 111 (1838) (*Ectenopsis*); Loew, Dipt. Südafrik. p. 15 (1860).

Subgenus ESENBECKIA, Rondani.

*Esenbeckia*, Rondani, Archivio Canestrini, iii. p. 83 (1863).

*E. vulpes*, ♂ ♀, Wiedem., Auss. zweifl. Ins. i. p. 111 (1828); Walker, List Dipt. v. Suppl. 1, p. 274 (1854) (*Silvius*); Rondani, Archivio Canestrini, iii. p. 83 (1863).—Brazil.

*E. pangonina*, ♀, Wiedem., Auss. zweifl. Ins. ii. p. 623 (1828) (*Silvius*); Rondani, Archivio Canestrini, iii. p. 83 (1863). [*Silvius Esenbeckii*, Wiedem., l. c.]—The specific name was changed by Rondani, who made use of Wiedemann's name of his species for the genus.—Brazil.

1. Third joint of antennæ simple.
2. Legs yellow ..... 3.  
Legs black ..... 4.
3. Reddish yellow. Posterior femora with  
black pubescence ..... *vulpes*, ♂ ♀, Wiedem.
4. Brown. Abdomen with white transverse  
bands ..... *pangonina*, ♀, Wiedem.

GASTROXIDES, Saunders.

*Gastroxides*, Saunders, Trans. Ent. Soc. iii. pt. i. p. 59 (1841); Loew, Dipt. Südafrik. p. 15 (1860).

\**G. ater*, ♂, Saunders, *l. c.* pl. v. fig. 4; ♀, Saunders, *l. c.* iv. p. 233, pl. xiv. fig. 33 (1847); Walker, List Dipt. i. p. 209 (1848), pt. v. p. 293 (1854); Loew, Dipt. Südafrik. p. 15 (1860); Wulp, Cat. Dipt. S. Asia (1896).

One male from Barrackpore, Calcutta (*Rothney*), 82. 15; one male from India (*Saunders Coll.*), 54. 13; one female from Bengal, 42. 25 (*Campbell*); one male (*Saunders Coll.*), 68. 4.

Saunders described and figured both the sexes; the male type he mentions as belonging to a Colonel Hearsey, so that it seems probable that the Museum does not possess the male type, and certainly not the female type. There are said to be three specimens labelled *Saunders Coll.* in the Oxford Museum, which may perhaps include the types.

#### CHRYSOPS, Meigen.

*Chrysops*, Meigen, Illig. Mag. ii. p. 267 (1803); Loew, Verh. zool.-bot. Gesell. Wien, viii. p. 613 (1858); id. Dipt. Südafrik. pp. 16, 27 (1860).

*Nemorius*, Rondani, Prodrome Dipt. Ital. i. p. 171 (1856).

The same remarks as to the tables for the identification of the species in the genus *Silvius* will also apply here, especially as regards the South-American species. For the characters of the genus Loew should be consulted in the two works mentioned above.

#### Nearctic Region.

On the species of *Chrysops* from this part of the world, see Osten Sacken's "Prodrome" in 'Memoirs Boston Society Natural History,' ii. (1876), in which is a most useful synoptical list, his 'Western Diptera' (1877), his 'Catalogue of North American Diptera' (1878), Williston in 'Transactions Kansas Academy,' x. (1885), and others.

Walker seems to have fallen into hopeless confusion over the species of *Chrysops* he described from North America, and Osten Sacken, not having the types themselves before him, was naturally not always correct in his attempts at rectifying Walker, as he himself anticipated; but though some of his species must now give way to Walker's, his descriptions still hold good, and should be consulted rather than those of Walker. I append a list of the species described since the publication of Osten Sacken's Catalogue, and of those whose synonymy must now be altered, chiefly

Walker and Osten Sacken species. *C. approximans*, ♀, Walker, List Dipt. pt. i. p. 198 (1848), from Florida, is not a *Chrysops*, but a specimen of *Diachlorus ferrugatus*, Fabr., and is thus classified in Osten Sacken's Catalogue.

*C. geminatus*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 205 (1828), excl. syn. Macq.; Walker, List Dipt. pt. i. p. 200 (1848); id. pt. v. Suppl. 1, p. 293 (1854); Osten Sacken, Cat. Dipt. N. America (1878). See v. der Wulp, Wien. ent. Zeit. iii. p. 139 (1884).

\**C. niger*, ♀, Macq., Dipt. Exot. i. p. 161 (1838); Walker, List Dipt. pt. i. p. 202 (1848); id. pt. v. Suppl. 1, p. 282 (1854); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 377 (1876); id. Cat. Dipt. N. Amer. (1878); Wulp, Tijd. v. Entom. xxiv. p. 161 (1881); Townsend, Trans. Amer. Entom. Soc. xxii. p. 57 (1895). [*C. carbonarius*, ♀, var. β, Walker, List Dipt. i. p. 203 (1848).]—United States, Canada.

\**C. furcatus*, ♀, Walker, List Dipt. i. p. 199 (1848); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 391 (1876); id. Cat. (1878).—Canada.

\**C. cincticornis*, ♀, Walker, List Dipt. pt. i. p. 201 (1848).—? N. America. [? *C. celer*, ♀, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 376 (1876).—Middle States.]

\**C. mærens*, ♀, Walker, List Dipt. pt. i. p. 201 (1848). [*C. æstuanus*, v. der Wulp, Tijd. v. Ent. x. p. 135, pl. iii. figs. 8, 9 (1867); Osten Sacken, l. c. p. 378 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. p. 132 (1887).]—United States, Canada.

\**C. carbonarius*, ♀, Walker, List Dipt. pt. i. p. 203 (1848). [*C. carbonarius*, ♀, var. γ, Walker, l. c. *C. niger*, ♀, Walker (nec Macq.), l. c. p. 202. *C. provocans*, ♀, Walker, Dipt. Saund. pt. i. p. 73 (1850). ? *C. ater*, ♀, Macq., Dipt. Exot. Suppl. 4, p. 40 (1850). *C. fugax*, ♀, Osten Sacken, l. c. p. 375 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. p. 132 (1887).]—Canada, United States.

\**C. divisus*, ♀, Walker, List Dipt. pt. i. p. 204 (1848). [*C. atropos*, ♀, Osten Sacken, l. c. p. 372 (1876); id. Cat. (1878).]—Florida.

\**C. excitans*, ♀, Walker, Dipt. Saund. pt. i. p. 72 (1850); id. List Dipt. pt. v. Suppl. 1, p. 281 (1854); Osten Sacken, l. c. p. 373 (1876); id. Cat. 1878; Williston, Trans. Kans. Acad. x. p. 132 (1887).—Canada and Northern U. States.

\**C. scalaratus*, ♀, Bellardi, Ditt. Mess. i. p. 72, pl. ii. fig. 9 (1859); Osten Sacken, Cat. (1878).—Mexico. [? *C. lateralis*, Wiedem., Auss. zweifl. Ins. i. p. 209 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 200 (1854); Osten Sacken, Cat. (1878).—Patria ignota (Wiedem.), Honduras (Walker).]

\**C. mitis*, ♀, Osten Sacken, l. c. p. 374 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. p. 132 (1887).—Canada.

\**C. sordidus*, ♀, Osten Sacken, l. c. p. 376 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. pp. 131, 134 (1887).—Canada, United States.

\**C. striatus*, ♀, Osten Sacken, l. c. p. 391 (1876); id. Cat. (1878).—Illinois. [*C. vittatus*, Bell. (nec Wiedem.), Ditt. Mess. i. p. 74 (1859).—Mexico.]

\**C. fulvaster*, ♂ ♀, Osten Sacken, Western Diptera, p. 221 (1877); id. Cat. Dipt. N. Amer. (1878); Williston, Trans. Kans. Acad. x. pp. 132, 134 (1887). [*C. coloradensis*, ♂ ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 605 (1892).]—Colorado.

*C. proclivis*, ♀, Osten Sacken, Western Diptera, p. 222 (1877); id. Cat.



- Dipt. N. Amer. (1878); Williston, Trans. Kans. Acad. x. pp. 132, 134 (1887). [*C. atricornis*, ♂ ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 603 (1892).]—California.
- C. crassicornis*, ♀, v. der Wulp, Wien. ent. Zeit. iii. p. 141 (1884); id. Ent. Belg. xxviii. p. 289 (1884). [*C. geminatus*, Macq., Dipt. Exot. Suppl. 4, p. 39 (1850) (excl. syn. Wiedem.).]—Mexico.
- C. cuchix*, ♀, C. P. Whitney, Canada Ent. xi. p. 35 (1879); Williston, Trans. Kans. Acad. pp. 131, 134 (1887).—Milford, N.H.
- C. cursim*, ♀, C. P. Whitney, *l. c.* p. 36; Williston, *l. c.* p. 134.—Milford, N.H.—Williston thinks this may be the same as *C. pudicus*, Osten Sacken.
- C. nigrilimbo*, ♀, C. P. Whitney, *l. c.*; Williston, *l. c.* p. 131.—Milford, N.H.
- C. discalis*, ♀, Williston, Trans. Conn. Acad. iv. p. 245 (1880); id. Trans. Kans. Acad. x. pp. 132, 134 (1887).—N. America.
- \**C. pertinax*, ♀, Williston, Trans. Kans. Acad. x. p. 132 (1887).—United States. [*C. nigriventris*, ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 604 (1892).]
- C. sequax*, ♂ ♀, Williston, *l. c.*—N. America.
- C. pachycerus*, ♂ ♀, Williston, *l. c.* p. 134.—N. America.
- C. altivagus*, ♂ ♀, Osten Sacken, Biol. Centr.-Amer. i. p. 45, pl. i. figs. 6, 7 (1886).—Durango, Mexico.
- C. coloradensis*, ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 605 (1892).
- C. ceras*, ♀, Townsend, Psyche, vii. p. 38 (1897).—New Mexico.
- C. fascialis*, ♀, Townsend, *l. c.* p. 39.—New Mexico.

*Chrysops altivagus* is included among the N.-American species, being just above the line of demarcation, as proposed by Wallace, between the two regions, and is expressly said by Osten Sacken to have an altogether northern physiognomy.

*Chrysops flavidus*, ♀, Wiedem., Dipt. Exot. i. p. 105 (1821); id. Auss. zweifl. Ins. i. p. 199 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 283 (1854); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 385 (1876); id. Cat. (1878).

*Chrysops canifrons*, ♀, Walker, List Dipt. i. p. 197 (1848); id. pt. v. Suppl. 1, p. 283 (1854).

*Chrysops pallidus*, ♀, Bellardi, Ditt. Mess. i. p. 73, pl. ii. fig. 16 (1859).

One female from Florida,  $\frac{40}{14}$  (*Doubleday*).

Walker's type, which is a specimen of this species, *C. flavidus*, Wiedem., as suggested by Osten Sacken.

*Chrysops vittatus*, ♀, Wiedem., Dipt. Exot. i. p. 106 (1821); id. Auss. zweifl. Ins. i. p. 200 (1828); Harris, Ins. New Engl. p. 406 (1841); Walker, List Dipt. pt. i. p. 196 (1848); id. pt. v. Suppl. 1, p. 284 (1854); Macq., Dipt. Exot. Suppl. 5, p. 37 (1850); Osten Sacken, Mem.

Boston Soc. Nat. Hist. ii. p. 390 (1876); id. Cat. 1878;  
Townsend, Trans. Amer. Ent. Soc. xxii. p. 57 (1895).

*Chrysops areolatus*, ♀, Walker, List Dipt. pt. i. p. 197 (1848).

*Chrysops lineatus*, ♀, Jænnicke, Neue Dipt. Exot. p. 26 (1868).

One female (Walker's type *C. areolatus*) from New York, 44. 90 (*Doubleday*); three females from Nova Scotia (*Redman*); three females from Nova Scotia, 74. 84 (*Walker Coll.*); two females from Horse Landing, St. John's River, Florida, May 1894, 96. 155 (*Johnson*); one female from Nova Scotia, 58. 136 (*Piffard*); one female from unknown locality.

On examining the type of *C. areolatus* I can confirm Osten Sacken's statement that it is identical with *C. vittatus*. It has the underside of the abdomen similar to the specimens mentioned by Townsend.

*Chrysops plangens*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 210 (1828); Walker, List Dipt. pt. i. p. 204 (1848); id. pt. v. Suppl. 1, p. 282 (1854); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 393 (1876); id. Cat. note 67 (1878); Williston, Trans. Kans. Acad. x. p. 134 (1885).

*Chrysops fuliginosus*, ♀, Wiedem., Dipt. Exot. i. p. 109 (1821); ♂, id. Auss. zweifl. Ins. i. p. 210 (1828); Walker, List Dipt. pt. i. p. 204 (1848); id. pt. v. Suppl. 1, p. 282 (1854).

One male and one female from Florida,  $3_{15}^{40} - 3_{16}^{40}$  19 (*Doubleday*); one male from Florida, 44. 12 (*Ent. Club*).

*Chrysops niger*, ♀, Macq., Dipt. Exot. i. (1) p. 161 (1838); Walker, List Dipt. pt. i. p. 202 (1848); id. pt. v. Suppl. 1, p. 282 (1854); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 377 (1876); id. Cat. (1878); Wulp, Tijds. v. Entom. xxiv. p. 161 (1881); Townsend, Trans. Amer. Entom. Soc. xxii. p. 57 (1895).

*Chrysops carbonarius*, ♀, var.  $\beta$ , Walker, l. c. pt. i. p. 203.

Walker's type and another female from Nova Scotia (*Redman*); three females from New York (*Foster*); one female from New York (*Doubleday*); one female, locality uncertain; two females from N. America, 81. 117 (*Lord Walsingham*).

Walker's type and another female of *carbonarius*, var.  $\beta$ , are specimens of *C. niger*, Macq., as Osten Sacken surmised, and the other specimens Walker placed here are correct

(and do *not* belong to *C. sordidus*, O. S.), with the exception of his type *C. niger* (nec Macq.), which belongs to *C. carbonarius*, Wlk.

*Chrysops furcatus*, ♀, Walker, List Dipt. pt. i. p. 199 (1848); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 391 (1876); id. Cat. (1878).

Type (female) from Hudson Bay District, Albany River, St. Martin's Falls, 44. 17 (not 47. 14) (*Barnston*). This species is *not* identical with *C. striatus*, Osten Sacken, as this author suggests, and I cannot find any other description of a North-American species similar to it, so that for the present at least it must stand as a distinct species. It differs from *C. striatus* in having the scutellum black, the second basal cell infuscated at the base, and the hyaline triangle reaching beyond the second longitudinal vein; it would follow *striatus* in Osten Sacken's synoptical list thus:

"Scutellum wholly black ..... *furcatus*, Wlk."

Walker's description may hold good with these further particulars:—Wings with the first basal cell infuscated half its length, the second only at its base; the band does not reach the posterior border, the fourth posterior cell being hyaline in its apical half, and the fifth at its base and apex; the apical spot hardly reaches beyond the first submarginal cell, the hyaline triangle extends beyond it, but does not attain the costa.

*Chrysops mærens*, ♀, Walker, List Dipt. i. p. 201 (1848).

*Chrysops æstuans*, ♀, Wulp, Tijd. Ent. x. p. 135, pl. iii. figs. 8, 9 (1867); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 378 (1876); Cat. (1878); Williston, Trans. Kans. Acad. x. p. 132 (1887).

Walker's type from Nova Scotia (*Redman*) answers perfectly to the description of Wulp's species, as pointed out by Osten Sacken; Walker's name must therefore take priority.

*Chrysops cincticornis*, ♀, Walker, List Dipt. pt. i. p. 201 (1848).

? *Chrysops celer*, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 376 (1876).

Described by Walker from an unknown locality. It is no doubt a North-American species, from its general likeness to those of that continent, and I believe it to be a dark and

badly-preserved specimen of *C. celer*, O. S. It is impossible to speak with certainty owing to its condition.

Type (female) from unknown locality.

*Chrysops carbonarius*, ♀, Walker, List Dipt. i. p. 203 (1848).

*C. carbonarius*, ♀, var.  $\gamma$ , Walker, *l. c.*

*C. niger*, ♀, Walker (nec Macq.), *l. c.* p. 202.

*C. provocans*, ♀, Walker, Dipt. Saund. pt. i. p. 73 (1850).

? *C. ater*, ♀, Macq., Dipt. Exot. Suppl. 4, p. 40 (1850).

*C. fugax*, ♀, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 375 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. p. 132 (1887).

Type of *carbonarius*, ♀, Wlk., from Nova Scotia (*Redman*).

Type of *carbonarius*, ♀, Wlk., var.  $\gamma$ , from Nova Scotia (*Redman*).

Type of *niger*, ♀, Wlk. (nec Macq.), from New York, 44. 90 (*Doubleday*).

Type of *provocans*, ♀, Wlk., from Cape Breton; one female from New York, 44. 90 (*Foster*); one female from Nova Scotia; one female from Canada, 74. 84 (*Walker*); one female from Calgary, N.W.T. Canada, 1894, 1901. 65 (*Ricardo*).

Walker's type *carbonarius* and the variety  $\gamma$  both answer exactly to the description of *C. fugax* as Osten Sacken suggests; his name must therefore give place to that of Walker, but his description should be referred to. The type of the *C. niger*, Macq., redescribed by Walker, is also a specimen of *C. carbonarius*, Wlk., and not of *C. sordidus*, Osten Sacken, as the latter suggests; he was evidently led to think so by Walker's description of the abdomen as having tawny spots; there is no trace of tawny colour on the abdomen of this type. The type *provocans*, Wlk., is nothing but a specimen of *C. carbonarius*, Wlk., differing slightly from the other species in having the fourth posterior cell wholly filled out with the dark colouring, so that the transverse band almost touches the hind border. Respecting the var.  $\beta$  of *carbonarius*, Wlk., see notice under *C. niger*, Macq.

*Chrysops divisus*, ♀, Walker, List Dipt. pt. i. p. 204 (1848).

*Chrysops atropos*, ♀, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 372 (1876); id. Cat. (1878).

Type (female) from Florida, 40. 3. 19. 17 (*Doubleday*), and another female from same locality.



Walker's type is evidently the same species as that described as *atropos* by Osten Sacken, who was in doubt as to the identity of the two species, owing to Walker's statement "Chest and abdomen clothed with dark tawny hairs." On examining the type, I can only see a few such coloured hairs on the dorsum of the abdomen and none on the thorax; in the other female they are still less noticeable.

*Chrysops excitans*, ♀, Walker, Dipt. Saund. pt. i. p. 72 (1850); List Dipt. pt. v. Suppl. 1, p. 281 (1854); Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 373 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. p. 132 (1887).

Type (female) from Cape Breton; one female from British Columbia, 47.86; two females from Hudson Bay district, Albany River, St. Martin's Falls, 44.17 (not 47.14) (*Barnston*); one female from Nova Scotia, 58.136 (*Piffard*); one female from Inverness, Woodcock's Landing, mouth of the River Skeena, British Columbia, 90.96 (*Keen*); three females from unknown localities.

The colour of the legs and of the antennæ is not quite the same in the type as in the description of this species by Osten Sacken, which is otherwise correct so far as the type is concerned. The first joint of the antennæ is wholly red, the second almost entirely so, only black at the apex, and the third joint is red at its base, then black. On the middle tibiæ the red is more widely extended, only the apex being black. One of the specimens was erroneously placed under *C. carbonarius*, Walker, and several under *C. sepulchralis*, Fabr.

*Chrysops scalaratus*, ♀, Bellardi, Ditt. Mess. i. p. 72, pl. ii. fig. 9 (1859); Osten Sacken, Cat. (1878).

? *Chrysops lateralis*, Wiedem., Auss. zweifl. Ins. i. p. 209 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 200 (1854); Osten Sacken, Cat. (1878).

One male from Vera Cruz, Mexico, 54.66 (*Sallé*); two females from Honduras, 285 *a* & 285 *b* (*Miller*); one female from Chili, 81.56 (*Edmonds*); one male from on or around volcano, Orizaba, Mexico, 56.143 (*Sallé*); one female from unknown locality, labelled by Walker as *trypeta* (I cannot find any published description of a *Chrysops* from North America under this name).

I believe the males are those of *scalaratus*; they only differ from the females in having the basal cells of the wing

infuscated half their length; the first antennal joint is incrassated in both sexes.

It seems very probable that *scalaratus* is a synonym of *lateralis*, Wiedem.; but, as Bellardi figured his species and Wiedemann's description is inadequate, I have followed Bellardi.

*Chrysops mitis*, ♀, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 374 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. p. 132 (1887).

One male and one female from Calgary, N.W.T. Canada, 1894, 1901. 65 (*Ricardo*).

*Chrysops sordidus*, ♀, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 376 (1876); id. Cat. (1878); Williston, Trans. Kans. Acad. x. pp. 131, 134 (1887).

Two females from Nova Scotia (*Redman*); one female from Nova Scotia.

Walker's *C. niger* is *not* the same as this species, as surmised by Osten Sacken, but is a specimen of *C. carbonarius*, Wlk. The specimen from Nova Scotia was wrongly placed under *C. carbonarius*, var.  $\gamma$ , Walker, and the two collected by Redman were placed under *C. mærens*, Wlk.

*Chrysops celer*, ♀, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 376 (1876); id. Cat. (1878).

One female from Nova Scotia (*Piffard*). It was wrongly placed under *C. carbonarius*, Walker.

*Chrysops frigidus*, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. pp. 384, 474 (1876); id. Cat. (1878).

One female from N. America, 81. 117 (*Lord Walsingham*).

*Chrysops morosus*, ♀, Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. pp. 389, 474 (1876); id. Cat. (1878).

? *Chrysops trinitatus*, Macq., Dipt. Exot. i. p. 161 (1838); Walker, List Dipt. pt. v. Suppl. 1, p. 282 (1854).

One female from N. America,  $\begin{smallmatrix} 40 \\ 117 \end{smallmatrix}$   $\begin{smallmatrix} 3 \\ 117 \end{smallmatrix}$  (*Childers*), was placed under *C. fuliginosus*, Wiedem. ? One female from Georgia (*Abbot*) is probably a specimen of this species; it was wrongly placed under *C. plangens*, Wiedem.

*Chrysops fulvaster*, ♂ ♀, Osten Sacken, Western Diptera, p. 221 (1877); id. Cat. (1878); Williston, Trans. Kansas Acad. x. pp. 132, 134 (1887).

*Chrysops coloradensis*, ♂ ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 605 (1892).

One female from Wet Mountain Valley, Colorado, 99. 522 (Cockerell).

The male type of *C. coloradensis*, Bigot, is a specimen of the above species, to which apparently *C. crassicornis*, v. der Wulp, is very nearly allied, if not the same, judging from the description of the latter.

*Chrysops proclivis*, ♀, Osten Sacken, Western Diptera, p. 222 (1877); id. Cat. (1878); Williston, Trans. Kans. Acad. x. pp. 132, 134 (1887).

*Chrysops atricornis*, ♂ ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 603 (1892).

The female type of Bigot's *C. atricornis* from Colorado answers exactly to Osten Sacken's description of his *C. proclivis*. The male type differs in the following particulars:—The face is yellow, only the pits of the callosities being black and clothed with long black hairs. The abdomen has the yellow on the first two segments less extended, the black spots being wider; the black dot on the sides of the second segment in the female is not present here, the yellow triangle intersecting the black spot on the second segment is reduced to a yellow margin; the black band on the third segment is continuous, not reaching the sides, with indentations of yellow on the posterior border. The fore legs are yellower, the apical half of the femora being yellow. The wings have the dark colouring extended into the second basal cell at its base and along its posterior margin, continuing the whole length of the fifth longitudinal vein.

*Chrysops sequax*, ♀, Williston, Trans. Kans. Acad. x. p. 132 (1885).

? One female from Georgia.

This was wrongly labelled *fascipennis*, var., Macq. I believe it to be a specimen of *C. sequax*; but the face does not altogether agree with Williston's description, being yellow, the callosities with only a brownish tinge, and the frontal callosity decidedly yellow, posteriorly with a black border; otherwise it agrees.

Mixed with some specimens labelled *C. sepulchralis*, Fabr., was one numbered 68. 4 among the N.-American species, Hudson's Bay being given on the label; but as this species

has not yet been found in N. America, this is hardly to be accepted as a proof of its occurrence, but is probably a mistake. Eight more specimens were also labelled *C. sepulchralis*, Fabr., but all belonged to other species.

*Chrysops pertinax*, ♀, Williston, Trans. Kans. Acad. x. p. 132 (1887).

*Chrysops nigriventris*, ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 604 (1892).

On comparing Bigot's type from Washington Territory with Williston's description of *C. pertinax*, I have no doubt that it is only a specimen of Williston's species; the only difference is in the wings, the fifth longitudinal vein being slightly shaded along its length in Bigot's type, which comes from the same locality as *C. pertinax*. There are six female specimens besides the type.

*Chrysops coloradensis*, ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 605 (1892).

A mixed species; the male type and four other specimens and three females belong to *C. fulvaster*, O. S.

The female type and one other specimen seem to be referable to a distinct species and are easily distinguished from *C. fulvaster* by the non-incrassated antennæ and the different pattern of the wings; they both come from Colorado.

I append a redescription of the type, which may be of use in identifying the species:—

Yellow. Abdomen with black spots; the second basal cell of wing slightly infuscated.

Face yellow, only the pits of the callosities being black, and a small black spot on the outer margin of each cheek. Palpi yellow. Antennæ black; the first two joints yellow, with black pubescence. Frontal tubercle yellow, with a black border; forehead yellowish, with yellowish pile and pubescence, the ocellar tubercle black. Thorax black, with four greyish-yellow stripes and yellow pubescence; the sides and breast with greyish tomentum and a black stripe on the latter. Abdomen yellow, with an oblong black spot on the first segment, slightly concave on its posterior border; two black pear-like spots on the second segment, converging on the anterior border, but not joined; on the third and fourth segments there are four black spots, divided up by the yellow colour; on the last three segments they coalesce into black bands with yellow posterior borders; on the other specimen there



is a faint black spot on the sides of the second segment; the pubescence is yellow on the yellow colour and black elsewhere; the underside of the abdomen is yellow and black. Legs yellow, the base of the femora, the knees, and the apical joints of the tarsi black; the fore tarsi are wholly black and the fore tibiae brown on the apical half. Wings hyaline, with the usual dark base, transverse band, and apical spot; the first basal cell is infuscated for nearly two thirds of its length and again at the apex, the second is only very slightly so at its base; the band reaches to the posterior margin, completely filling the fourth posterior cell, but the fifth and the anal cell and the anal angle are clear; the fifth longitudinal vein is slightly clouded along its length; the apical spot is united to the dark colouring of the fore border, but the hyaline triangle reaches a little beyond the first longitudinal vein; the apical border of the band is slightly produced towards the base of the fork of the second longitudinal vein.

Length 9 millim.

This species in the markings of the abdomen and the wings is nearly allied to *C. furcatus*, Wlk.; but the spots on the second segment distinguish it.

#### *Neotropical Region.*

There are thirty described species of *Chrysops* from the Neotropical Region, the greater number of these being from South America. Two of Walker's species belong to the genus *Diachlorus*, another is not to be found in the British Museum collection, and one of Rondani's is identical with a Fabrician species. One new species is here described, which brings the number to *twenty-seven*. I have attempted to form a synoptical list of these, but having very small material to work upon, I fear it is far from being a final one; the descriptions given by Wiedemann and others are very meagre, and I have been forced to make use of the markings of the abdomen, which do not constitute a very satisfactory specific character in this genus. It may be of use in at least grouping together those species related to each other, and in rendering the work of anyone who has larger material and access to the older types easier in compiling a more perfect list.

Many species seem very nearly related: thus *latus*, F., *varians*, W., *lateralis*, W., are all said by Wiedemann to be very similar, *varians* being probably only a variety of *latus*; *leucospilus*, W., he considers is nearly related to *guttula*, W., and Schiner says it only differs from *incisus*, Macq., by its

greater size and in the wing, as shown in my table. This latter author thinks *incisus* may be the same as *guttula*, W.; it appears to me that *crucians*, W., is allied to *incisus*; thus *incisus*, *crucians*, *leucospilus*, and *guttula* all seem to be very nearly related, and may prove to be one or more species only, when good series of them are obtained for comparison. I can find no real difference between *molestus*, W., and *intrudens*, Williston, judging from the descriptions only, neither of which are very plain; they are grouped together for the present in the table with *oculatus*, Bigot: *merula*, Philippi, a Chilian species, is placed first among those species with a band and no clear spot in the discal cell of the wing; but as it is not stated whether a male or female was being described, and the description is most meagre, it is impossible to distinguish it better: *trifariam*, Macq., and *latifasciatus*, Bell., seem very nearly allied; Macquart's type was from Chili, Bellardi's from Mexico, and it is also found in Central America. *C. fulviceps*, Wlk., List Dipt. pt. v. Suppl. 1, p. 286, is not to be traced; *immaculatus*, Wiedem., is bracketed with *bimaculatus*, Wiedem., as the author suggests it is only a variety of the latter. The plate of *C. lugubris*, Macq., is apparently incorrect. The *Chrysops varipes*, Walker, described on page 289 (List Dipt.), does not belong to this genus, but is a specimen of *Diachlorus curvipes*, Fabr.; the *Chrysops inornatus*, Walker, List Dipt. pt. i. p. 199, is a specimen of *Diachlorus bivittatus*, Wiedem.; the *Chrysops convergens* and *approximans*, Wlk. List Dipt. i. p. 198 (1848), are both specimens of *Diachlorus ferrugatus*, Fabr. (see Osten Sacken, Mem. Boston Soc. Nat. Hist. ii. p. 396, respecting this species and its synonyms).

The following is a list of the twenty-seven described species from this region, including one new, with a table for their identification:—

- \**C. costatus*, ♂ ♀, Fabr., Ent. Syst. iv. p. 373 (1794) (*Tabanus*); id. Syst. Antl. p. 112 (1805); Pal. Beauv., Ins. p. 223, pl. iii. fig. 7 (1805–1821); Wiedem., Dipt. Exot. i. p. 104 (1821); id. Auss. zweifl. Ins. i. p. 198 (1828); Macq., Dipt. Exot. i. p. 160 (1838); Bigot, R. de la Sagra's Hist. Cuba, p. 798 (1857); Guérin, Icon. iii. p. 542, pl. xcvii. fig. 3 (1844); Osten Sacken, Cat. Dipt. N. Amer. (1878); id. Berlin. ent. Zeit. xxvii. p. 297 (1883); id. Biol. Centr.-Amer., Dipt. i. p. 46 (1887); Williston, Trans. Kans. Acad. x. p. 134 (1887); Townsend, Trans. Amer. Ent. Soc. xxii. p. 56 (1895); id. Ann. & Mag. Nat. Hist. (6) xix. p. 18 (1897). [? *Tabanus variegatus*, De Geer, Ins. vi. pl. xxx. fig. 7 (1776). *Chrysops vulneratus*, Rond., Esame varie specie, &c. p. 44 (1848); Osten Sacken, Berlin. ent. Zeit. xxvii. p. 297 (1883). *Chrysops amazonius*, Rond., Archivio Canestrini, iii. p. 81 (1864).]—Central and South America, W. Indies.

- C. tristis*, ♀, Fabr., Ent. Syst., Suppl. p. 567 (1798) (*Tabanus*); id. Syst. Antl. p. 112 (1805); Wiedem., Dipt. Exot. i. p. 103 (1821); id. Auss. zweifl. Ins. i. p. 197; Walker, List Dipt. pt. v. Suppl. 1, p. 288 (1854).—Cayenne.
- \**C. latus*, ♀, Fabr., Syst. Antl. p. 112 (1805); Wiedem., Dipt. Exot. i. p. 108 (1821); id. Auss. zweifl. Ins. i. p. 207 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 286 (1854); Schiner, Reise Novara, p. 103 (1866).—Brazil.
- { *C. bimaculatus*, ♀, Wiedem. Auss. zweifl. Ins. i. p. 201 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 287 (1854).—Brazil.  
*C. immaculatus*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 202 (1828).—Brazil.
- C. leucospilus*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 202 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 286 (1854); Schiner, Reise Novara, p. 104 (1866).—Brazil, Colombia.
- \**C. guttula*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 203 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 286 (1854).—Brazil.
- C. afflictus*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 204 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 288 (1854).—Brazil.
- C. molestus*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 205 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 288 (1854).—Brazil.
- C. varians*, ♂ ♀, Wiedem., Auss. zweifl. Ins. i. p. 208 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 287 (1854); Schiner, Reise Novara, p. 104 (1866); Williston, Kans. Univ. Quart. Journ. iii. p. 192 (1895).—Brazil, Equatorial America.
- C. lateralis*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 209 (1828); Walker, List Dipt. pt. i. p. 200 (1848); id. pt. v. Suppl. 1, p. 286 (1854); Osten Sacken, Cat. Dipt. N. Amer. (1878).—Central and S. America.
- \**C. crucians*, ♀, Wiedem., Auss. zweifl. Ins. i. p. 211 (1848); Walker, List Dipt. pt. v. Suppl. 1, p. 287 (1854); Jænnicke, Neue exot. Dipt. p. 4 (1868); Osten Sacken, Cat. Dipt. N. Amer. (1878).—Brazil, Cuba.
- C. tardus*, ♂, Wiedem., Auss. zweifl. Ins. i. p. 577 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 285 (1854).—Brazil.
- C. frontalis*, ♂, Macq., Dipt. Exot. i. p. 160 (1838); Walker, List Dipt. pt. v. Suppl. 1, p. 284 (1854); Osten Sacken, Cat. Dipt. N. Amer. (1878).—Brazil, St. Domingo.
- C. trifariam*, ♀, Macq., Dipt. Exot. i. p. 159 (1838); Walker, List Dipt. pt. v. Suppl. 1, p. 287 (1854); Blanchard, Gay, Hist. fis. y polit. de Chile, Zool. vii. p. 399 (1854); Philippi, Verh. zool.-bot. Gesell. Wien, xv. p. 724 (1865).—Chili.
- C. lugubris*, ♀, Macq., Dipt. Exot. Suppl. 1, p. 44, pl. iv. fig. 11 (1846); Walker, List Dipt. pt. v. Suppl. 1, p. 285 (1854).—Brazil.
- C. incisus*, ♀, Macq., Dipt. Exot. Suppl. 1, p. 44, pl. iv. fig. 12 (1846); Walker, List Dipt. pt. v. Suppl. 1, p. 285 (1854); ♂, Schiner, Reise Novara, p. 104 (1866).—New Granada.
- C. subfascipennis*, ♀, Macq., Dipt. Exot. Suppl. 5, p. 35 (1850).—S. America.
- C. terminalis*, ♀, Macq., Dipt. Exot. Suppl. 5, p. 36 (1850).—S. America.
- C. latifasciatus*, ♀, Bellardi, Ditt. Mess. i. p. 71, pl. ii. fig. 15 (1859); Osten Sacken, Cat. Dipt. N. Amer. (1878); id. Biol. Centr.-Amer., Dipt. i. p. 46 (1886).—Mexico, Central America.
- C. merula* (? ♂ or ♀), Philippi, Verh. zool.-bot. Gesell. Wien, xv. p. 724 (1865).—Chili.
- C. calogaster*, ♀, Schiner, Reise Novara, p. 103 (1866).—S. America.
- C. tanycerus*, ♀, Osten Sacken, Biol. Centr.-Amer., Dipt. i. p. 46 (1886).—Costa Rica.

*C. Frazari*, ♀, Williston, Trans. Kansas Acad. x. p. 132 (1887).—San Domingo.

*C. oculatus*, ♀, Bigot, Mém. Soc. Zool. Fr. v. p. 606 (1892).—Brazil.

*C. intrudens*, ♂ ♀, Williston, Kansas Univ. Quart. iii. p. 191 (1895).—Brazil.

\**C. brasiliensis*, ♂ ♀, sp. n.—Brazil.

1. Wings with a distinct dark transverse band ..... 2.  
Wings without a distinct dark transverse band ..... 15.
2. Wings with a clear spot in the discal cell ..... 3.  
Wings without a clear spot in the discal cell ..... 5.
3. Yellow species with black stripes on the abdomen ..... 4.
4. Abdomen with the black stripes bifurcated posteriorly. Thorax with three brown stripes ..... *costatus*, ♀, Fabr.  
Abdomen with the black stripe simple. Thorax testaceous ..... *subfascipennis*, ♀, Macq.
5. Abdomen wholly black ..... *merula* (? ♂ or ♀), Philippi.  
Abdomen black or brown, with yellow spots ..... 6.
6. Abdomen with a yellow or whitish spot on each side of the second segment, and yellow spots, triangular, square, or oblong, in the middle of the posterior borders of the segments, sometimes forming a continuous stripe ..... 7.
7. Abdomen with additional yellow spots on the sides or hind borders of the segments ..... 8.  
Abdomen with no additional yellow spots. ..... 9.  
Abdomen with the hind borders of the segments yellow or grey, forming more or less regular bands ..... 12.
8. Abdomen dark brown, with two additional yellow spots on segments 2 to 5, those on the last three more or less confluent. Thorax with four yellow stripes ..... *Frazari*, ♀, Williston.  
Abdomen black, with the additional yellow spots on each side of the segments. Thorax black ..... *latifasciatus*, ♀, Bellardi.  
Abdomen black, with an extra yellow spot on the anterior margin of the second segment. Thorax with five yellow spots. ..... *trifariam*, ♀, Macq.
9. Wings on inner edge of dark band with a broad hyaline sinus ..... 10.  
Wings with only a small clear spot in the band, on the inner edge, before its junction with the border ..... 11.
10. Abdomen brown, with the usual yellow spots forming the letter T, and an additional yellow stripe on the sides of segments 4 and 5. Legs yellowish. Apex of the wing dark ..... *crucians*, ♀, Wiedem.



- Abdomen black, with the usual yellow spots. Legs yellowish brown. Apex of the wing clear . . . . .
11. Abdomen black, the spots on the sides of the second segment almost square, with four triangular whitish median spots. Legs black . . . . .
12. Abdomen black, the spots on the sides of the second segment almost triangular, with three subtriangular white median spots. Legs brown . . . . .
13. Wings with the apical margin of the band straight . . . . .
- Wings with the apical margin of the band irregular . . . . .
14. Abdomen with two additional grey spots on the posterior margin of the second segment. Legs dark brown . . . . .
- Abdomen with yellow spots on the posterior margin of the third and fourth segments forming a lateral stripe. Legs brownish . . . . .
- Abdomen with the median spot on the second segment oblong, not triangular. Legs brownish . . . . .
- Abdomen with the median spot on the second segment small and triangular. Legs reddish brown . . . . .
15. Abdomen black, the median triangular spot orange-yellow . . . . .
- Abdomen brown, with four additional whitish spots on each segment . . . . .
16. Wings clear or with only the apex darker. Wings brown or black, with clear spots. . . . .
- Wings clear, with brown markings and spots . . . . .
17. Abdomen yellow, with brown spots on the second segment and brownish markings. Wings clear . . . . .
- Abdomen with no brown spots . . . . .
- Abdomen yellow. Apex of wing black. . . . .
18. Abdomen black or brown, with yellow spots or stripes . . . . .
- Abdomen black, unspotted, the hind borders of segments yellow . . . . .
- Abdomen wholly black or brown . . . . .
19. Abdomen with hind borders of segments yellow . . . . .
- Abdomen with hind borders of segments not yellow . . . . .
20. Wings black, with three clear spots and subhyaline apex . . . . .
- Wings brown, with one larger and three smaller clear spots . . . . .
- Wings brown, with one larger and two smaller clear spots . . . . .
- incisus*, ♂ ♀, Macq.
- leucospilus*, ♀, Wiedem.
- guttula*, ♀, Wiedem.
- 13.
- 14.
- varians*, ♂ ♀, Wiedem.
- lateralis*, ♀, Wiedem.
- lætus*, ♀, Fabr.
- brasiliensis*, ♂ ♀, sp. n.
- calogaster*, ♀, Schiner.
- tristis*, ♀, Fabr.
- 16.
- 17.
- 23.
- bimaculatus*, ♀, Wiedem.
- immaculatus*, ♀, Wiedem.
- terminalis*, ♀, Macq.
- 18.
- 21.
- 22.
- 19.
- 20.
- tardus*, ♂, Wiedem.
- oculatus*, ♀, Bigot.
- molestus*, ♀, Wiedem.
- intrudens*, ♂ ♀, Williston.

21. Wings brown, with four white spots.  
Femora black. .... *frontalis*, ♂, Macq.
22. Abdomen brownish black. Antennæ  
and legs black ..... *lugubris*, ♀, Macq.
23. Wings with a brown cloud round the  
cross-veins and in the apex ..... 24.
24. Abdomen brown, with faint white spots  
and white hind margins of segments .. *tanycerus*, ♀, Ost. Sacken.  
Abdomen yellow, with brown spots and  
markings..... *afflictus*, ♀, Wiedem.

*Chrysops costatus*, ♂ ♀, Fabr.

Three females from Jamaica, 45. 110 (*Gosse*) ; one male from Villa Nova, Amazons, 55. 44 (*Bates*) ; two females from St. Domingo, 55. 1 (*Tweedie*) ; six females from Amazons, 66. 53 (*Bates*).

The two females from St. Domingo approach the description of those from San Rafael, Vera Cruz, by Townsend, the outer branch of the two blackish abdominal markings being abbreviated and not longer than the inner one, and the distal border of the band of the wing is somewhat convex. The male differs only by the base of the wing being somewhat darker.

Rondani states his *amazonius* resembles *subfasciatus*, Macq. (I presume he means *subfascipennis*, Macq., as there is no *Chrysops* described under the former name), and *vulneratus*, Rond., of which last it is perhaps only a variety. Osten Sacken makes *vulneratus* the same as *costatus*, and I have little doubt that *amazonius* is also a synonym of the Fabrician species, to which *subfascipennis*, Macq., is evidently nearly related.

*Chrysops lætus*, ♀, Fabr.

Two females from Brazil, 68. 4 (Saunders Coll.), and another female labelled 68. 4.

One of the specimens has the face rather dark, which makes it doubtful whether it belongs to this species.

*Chrysops guttula*, ♀, Wiedem.

One female from Pará, 68. 4.

*Chrysops crucians*, ♀, Wiedem.

One female from South America, 54. 13 (Saunders Coll.).

*Chrysops oculatus*, ♀, Bigot.

There is only one specimen (the type female). On comparing it with the description of *C. molestus*, Wiedem., it

seems very similar; but Wiedemann's rather vague description of the wings of his species makes it doubtful whether the two species are identical; it is also very similar to *C. intrudens*, Will., but he makes no mention of the small round clear spot in the centre of the first submarginal cell seen in *C. oculatus*; it must therefore remain for the present bracketed with the two above-mentioned species.

The following is an exact description of the wings:—Brown, with one larger and three smaller clear spots; the larger one consists of the apical half of the two basal cells and of the anal cell with the exception of its extreme apex; the anal angle is subhyaline; the three other spots are thus situated—one round spot in the centre of the first submarginal cell, one in the second posterior cell extending into the third, and a triangular one in the fifth posterior cell; these last two become subhyaline on reaching the hind border.

*Chrysops brasiliensis*, ♂ ♀, sp. n.

Length 9 millim.

Type (male), Amazons, 66. 53 (*Bates*); type (female), Rio Tapayos, Brazil, 53. 27 (*Bates*); one female from Pará, 49. 2 (*Bates*); one female from the Amazons, 66. 53 (*Bates*).

Several of these specimens were labelled *frontalis*, Macq., by Walker incorrectly.

Brown. Abdomen with a small yellow-haired triangular spot in the centre of the second and third segments, and with yellow bands on the posterior borders of the fourth, fifth, and sixth segments.

Face and tubercles yellow. The callosity on the forehead yellow, with the posterior border black, the forehead black; between the callosity and the vertex is a band of yellow tomentum, divided in the middle. Antennæ yellow, the third joint darker; the first joint is slightly incrassated and a little longer than the second. Thorax brown, with indistinct stripes; the sides of the breast brown, with a yellow stripe. Scutellum brown. Abdomen brown, with an indistinct small pale yellow spot on each side of the first segment and a larger one on the second, and a triangular bright yellow-haired spot on the centre of the posterior borders of the second and third segments; there is a trace of a yellow band on the posterior border of the third segment, which becomes distinct on the three following ones. Underside of abdomen brown. Legs brown, the anterior and middle femora almost wholly yellowish, the posterior femora only so at their apex; the anterior and middle tibiæ likewise yellowish, and the tarsi

the same, with the last joints darker; the hind ones are slightly curved and covered with short pubescence. Wings clear, with the usual dark brown colouring at the base, on the fore border, and as a transverse band, this latter with a hyaline sinus on the inner border, leaving the fifth posterior cell clear except at its base; the apical spot is long and narrow, the apical border of the band is straight; the fifth longitudinal vein is slightly shaded with the darker colour.

The male is similar, but the yellow band on the third segment is as distinct as the others and the spots on the sides of the second segment obsolete; the triangle between the base of the antennæ and the eyes is wholly yellow; the tibiæ are browner and the pubescence on the posterior pair thicker; the basal cells of the wings are darker, as usual in the males of this genus, having only a narrow clear stripe between them and the band.

[To be continued.]

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XLI.—*Descriptions of Fourteen new Species of Terrestrial Mollusca from South Africa.* By JAMES COSMO MELVILL, M.A., F.L.S., and JOHN HENRY PONSONBY, F.Z.S.

[Plate II.]

OUR last contribution towards the elucidation of the South-African non-marine molluscan fauna appeared in the 'Annals' for September 1899\*, immediately before the outbreak of the Boer war. Notwithstanding the disturbed state of the country, however, several of our correspondents have been able to successfully continue the prosecution of their researches, with the following results. We would especially call attention to a most interesting Subulinoid form, with the last whorl partially evolute, and also a remarkable *Obeliscus*.

*Ennea Berthæ*, sp. n. (Pl. II. fig. 1.)

*E. testa* ovato-cylindrica, delicata, crystallina, læviuscula; anfractibus (apicali incluso obtusissimo) sex, parum ventricosis; apertura oblongo-ovata; peristomate apud basin paullum elongato, incrassato, albo, nitido, dentibus plicisve quatuor instructo, videlicet, plica parietali acuta, intrante, dente labiali crasso, indiviso, basali minuto, acuto, plica columellari interna, longa, tenui, acuta. Long. 3·50, lat. 1·25 mm.

\* Ann. & Mag. N. H. ser. 7, vol. iv. pp. 192-200.



*Hab.* Karkloof Bush, 25 miles N. of Pietermaritzburg, Natal (*J. McBean*).

A very beautiful transparent species, the complicated peristomatal processes of which, as detailed above, seem peculiar. It belongs, as suggested to us by Mr. Burnup, doubtless to the same group as *E. cimolia*, M. & P.

*Ennea columnella*, sp. n. (Pl. II. fig. 2.)

*E.* testa minuta, cylindrica, delicatissima, pellucida, nitida; anfractibus 6, quorum apicales obtusi, compressi, cæteris apud suturas impressis, parum tumidis, vitreis, interdum, præter circa suturas, perlævis, interdum undique longitudinaliter striatis; apertura triangulatum ovata; peristomate albo, nitido, incrassato, plicis dentibusve quatuor instructo, videlicet, plica parietali acinaeiformi, profunde intrante, recta, vel paullum obliqua, dente labiali bifurcato, basali parvo, in speciminibus quibusdam perobscuro, plica columellari magna, intrante, supra obtusa.

Long. 2, lat. .75 mm.

*Hab.* Karkloof Bush, Pietermaritzburg, Natal (*J. McBean*).

Doubtless allied both in texture as well as, to some extent, in disposition of dental and plicatular arrangement to *E. cionis* or *caryatis*, M. & P., but very much smaller in all its parts. We have seen several examples, mostly adult, with peristomatal processes complete, and, as noted above in the description, these exhibit amongst themselves considerable, if merely superficial, variation.

Though so minute, it is one of the most exquisite species of the genus known to us.

*Ennea foriculusa*, sp. n. (Pl. II. fig. 3.)

*E.* testa oblongo-cylindriciformi, læviuscula, subpellucida, delicata; anfractibus 8, quorum apicalis obtusissimus, cæteris parum ventricosus, supernis angustioribus, ultimo paullum elongato; apertura ovato-rotunda; peristomate albo, crassiusculo, nitente, plicis dentibusve multis complicatis, aperturam ipsam fere obtegentibus, munito, videlicet, plica parietali normali, intrante, dente labiali permagno, bifido, intrante, dentibus duobus basalibus, altero interno, altero magis superficiali, obliquo, plica columellari tumida, interna, duplicata, superiore acinaciformi, acuta.

Long. 8.50, lat. 3.25 mm.

*Hab.* Table Mountain, Natal (*Burnup*).

Allied to *E. Menkeana*, Pfr., which we have not seen and only know by the description and figure. Our species would seem to differ in being only two thirds the size of Pfeiffer's species and also slightly more elongate in form. The peristomatal processes seem of the same character, but intensified

(especially so far as the columellar plaits are concerned) in *E. foriclusa*.

*Ennea Hickeyana*, sp. n. (Pl. II. fig. 4.)

*E. testa* crassa, dolioliformi, cylindrica, pallide albo-straminea; anfractibus 7, quorum apicalis obtusissimus, lævis, cæteris tumidulis, undique longitudinaliter rudi-liratis; apertura rotundolunari; peristomate albo, nitido, crasso, plicis dentibusve tribus munito, plica parietali acuta, magna, intrante, dento labiali mediocri, plica columellari interna, nequaquam conspicua.

Long. 7, lat. 3·50 mm.

*Hab.* Biggarsberg, Natal (*Miss Hickey*).

This species is apparently exactly intermediate between *E. eximia* and *Collieri*, M. & P., the peristomatal processes being similar in all three; but, whilst considerably smaller and of different texture to the former, it is not only of far greater magnitude in all its parts than *E. Collieri*, but likewise of a more inelegant cylindrical "tun" shape.

We have much pleasure in conferring upon this interesting form the name of its discoverer, Miss Hickey.

*Obeliscus lymneæformis*, sp. n. (Pl. II. fig. 5.)

*O. testa* conspicua, olivaceo-straminea, attenuato-fusiformi, cylindrica, tenui, nitida; anfractibus 10-11, quorum tres superiores sordide albi, parum nitentes, apex ipse obtusus, in speciminibus nostris plus minus detriti, cæteris ad suturas paullum impressis, ventricosulis, sub lente leniter et irregulariter striatis, ultimo tres anfractus proximos conjunctim exæquante, angusto, prolongato; apertura ovato-lunari; peristomate tenui, supra paullum contracto, ad basin vix effuso, margine columellari crassiusculo, uniplicato.

Long. 39, lat. 8·25 mm. (sp. max.).

„ 34, „ 7·50 „ (sp. min.).

*Hab.* Karkloof Bush, Natal (*J. McBean*).

A fine species, with no near ally in its fauna. The two examples before us vary slightly *inter se*, the larger being basally more attenuate and not possessing the slight labial effusion of its fellow, while the substance is more pellucid and the colour clear straw. Both are more or less apically detrite.

*Subulina Purcelli*, sp. n. (Pl. II. fig. 6.)

*S. testa* fusiformi, supra attenuata, tenui, parum nitida, læviuscula, pallide olivaceo-viridescens; anfractibus 9, quorum apicales duo

mamillati, obtusissimi, cæteris tumidis, anfractu ultimo curto; apertura ovata; peristomate tenui, paullulum effuso, margine columellari crassiusculo, albo, versus basin truncatulo.

Long. 17, lat. 4.50 mm.

*Hab.* Caledon, Cape Colony (*R. M. Lightfoot*).

A *Subulina* of unusual form, perhaps not quite adult. The tumid whorls, extremely obtuse apex, want of sculpture, peculiar olive-green hue, and somewhat compressed body-whorl amply characterize it.

By the desire of Mr. Lightfoot, of the South-African Museum, Cape Town, who himself forwarded us the specimens for description, we have named it after Mr. Purcell, the discoverer.

*Subulina strigilis*, sp. n. (Pl. II. fig. 7.)

*S.* testa minuta, rimata, pergracili, attenuato-fusiformi, crystallina, electrino-straminea; anfractibus 8, quorum apicalis fere immersus, obtusus, cæteris delicate et arctissime oblique-striatis, ultimo elongato; apertura anguste ovata; peristomate tenui, margine columellari reflexo.

Long. 7.25, lat. 2 mm. (sp. max.).

*Hab.* Karkloof Bush, near Pietermaritzburg, Natal (*J. McBean*).

A beautifully striate species, of which we have seen four examples, slightly varying in size, but in all other respects uniformly alike.

#### HYPOLYSIA \*, gen. nov.

Testa gracilis, fusiformis, attenuata, sicut in *Subulina*, sed apud suturas undique incrassata; † anfractu ultimo anguste sed distincte evoluto.

*Hypolysia Florentiæ*, sp. n. (Pl. II. fig. 8.)

*H.* testa eleganter attenuata, tenui, delicata, albo-crystallina; anfractibus 9–10, quorum apicales duo mamillati, obtusi, cæteris apud suturas incrassatis, tumidis, sub lente longitudinaliter oblique-striatulis, anfractu ultimo quatuor proximos longitudine exsuperante; apertura parva, oblonga; peristomate tenui, supra evoluta; columella recta, versus basin truncata.

Long. 11.50, lat. 2.50 mm.

*Hab.* Durban, Natal (*Burnup*).

For this extremely delicate, milk-white, crystalline species

\* *ὑπόλυσις*, a loosening below.

† This detail is unfortunately not brought out in our figure.

we have been constrained to propose a new genus, based entirely upon the unusual characters as displayed conchologically. Since drawing up this description we have received a further supply of specimens, some with the soft parts; these we have handed to Mr. Stephen Pace, who will shortly, we hope, publish the anatomical details.

*Fauxulus (Anisoloma) McBeanianus*, sp. n.  
(Pl. II. fig. 9.)

*F.* testa sinistrorsa, subrimata, obesa, cinereo-fusca; anfractibus octo, quorum duo apicales tumidi, depressiusculi, fere læves, cæteris arcte et regulariter longitudinaliter oblique-liratis, liris incurvis, anfractu ultimo depresso tumido; apertura subtriangulari; peristomate albo, nitido, incrassato, octo plicis instructo, videlicet, parietalibus duabus, labialibus (simul ac basalibus) duabus valde intrantibus, inter se simillimis, hac basali parva, perobliqua, illa majore, versus columellam inclinante, duabus plicis columellaribus approximatis, parvis, fere superficialibus.

Long. 5, lat. 2.25 mm. (sp. maj.).

*Hab.* Karkloof Bush, near Pietermaritzburg, Natal (*J. McBean*).

Smaller than our *F. pereximius* (Ann. & Mag. N. H. ser. 6, vol. xix. p. 638, 1897) and differing in the disposition of the columellar processes. It is likewise a stouter shell in proportion to its length, the longitudinal incurved liræ being more symmetrically disposed. We follow Ancey in the sectional arrangement of this genus.

We are indebted for several of the novelties described in this paper to the researches of Mr. J. McBean, and have much pleasure in associating this beautiful *Fauxulus* with his name.

*Pupa endoplax*, sp. n. (Pl. II. fig. 10.)

*P.* testa obesa, cylindriformi, brunnea, tenui; anfractibus 6-7, ad suturas paullum impressis, tumidulis, longitudinaliter oblique-striatis, ultimo anfractu versus basin rotundato; apertura lunato-ovata; peristomate incrassato, haud continuo, quatuor-plicato, plica suturali acuminata, columellari mamillata, duabus internis, nequaquam peristoma ipsum attingentibus, paullum incurvatis.

Long. 3, lat. 1.50 mm.

*Hab.* Cradock, at roots of bushes (*Farquhar*).

A curious and distinct form, with the peculiar internal plaits just in front of the orifice, but not reaching the peristome.



*Pupa ridibunda*, sp. n. (Pl. II. fig. 11.)

*P.* testa minuta, subrimata, brunnea, tenui; anfractibus 6, quorum apicalis depressus, vitreus, cæteris ad suturas impressis, ventricosis, arcte sub lente oblique-striatis; apertura rotunda; peristomate brunnescente, continuo et (præcipue marginem apud columellarem) crassiusculo, tribus dentibus plicisve prædito, videlicet, plica parietali bifida, prominula, dente basali acuto, plica columellari bifurcata, intrante.

Long. 2, lat. 1 mm.

*Hab.* Under low trees at base of Elandsberg Mountains (*Farquhar*).

A ventricose little species, with continuous peristome and complicated arrangement of mouth-processes. It does not appear nearly allied to any other species we know from the South-African region.

*Curvella caloglypta*, sp. n. (Pl. II. fig. 12.)

*C.* testa ovata, subrimata, tenui, subpellucida; anfractibus 5, apicali incluso minuto, depresso, omnibus ad suturas impressis, gradato-ventricosulis, undique longitudinaliter arcuissime et oblique liratis, ultimo anfractu cæteros permultum superante; apertura ovata; peristomate tenui, margine columellari paulum incrassato, triangulatim reflexo.

Long. 4.50, lat. 3 mm.

*Hab.* Otto's Bluff, near Pietermaritzburg, Natal (*Burnup*).

From the three *Curvella* hitherto found in the South-African region, *C. catarractæ*, *sinuosa*, and *globosa*, M. & P., this most delicate species differs in the more quadrate whorls, compressed sutures, and especially in the close and regular oblique longitudinal liration, which needs, of course, a lens to bring out its beauty. It has only hitherto been found in very small quantity.

*Buliminus (Rhachis) dimerus*, sp. n.

(Pl. II. fig. 13.)

*B.* testa pyramidata, delicata, tenui, subpellucida, nitida, supra sub lente omnino decussatula, brunnea, infra anfractus ultimi peripheriam usque apud basin læte straminea, fere lævi; anfractibus 7, quorum apicali obtuso, nigro-brunneo, cæteris ad suturas impressis, tumidulis, ultimo ad peripheriam carinato, zonato; apertura fere rotunda; peristomate vix incrassato, tenui, margine columellari triangulatim reflexo.

Long. 14, lat. 9 mm.

*Hab.* Karkloof Bush, N. of Pietermaritzburg, Natal (*J. McBean*).

An ally of *B. meridionalis*, Pfr., but differing in both coloration, texture, and form.

*Melampus ordinarius*, sp. n. (Pl. II. fig. 14.)

*M. testa solida, gilvo-straminea, conico-pyramidata; anfractibus novem, quorum apicali mamillato, in sp. juvenili acuminato, septem superioribus compressis, angustissimis, ultimo permagno, ad peripheriam subangulato, lævi, obeso; apertura oblonga, apud basin latiore; peristomate parum incrassato, intus spiraliter et superficialiter quatuor-plicato; columella biplicata.*

Long. 10, lat. 4.50 mm.

*Hab.* Mouth of Umlaas River, Natal (*Burnup*).

This small and somewhat insignificant *Melampus* was found in company with *M. castaneus*, Muhlf., and *Assimineea umlaasiana*, Smith, in a cavern at the habitat given above, and though its characters are not prominent, we are unable to assign it to any known species. We have examined several examples in various stages of growth, the apex being very acuminate in young specimens.

#### EXPLANATION OF PLATE II.

- Fig. 1. Ennea Berthæ.*
- Fig. 2. — columnella.*
- Fig. 3. — foriculus.*
- Fig. 4. — Hickeyana.*
- Fig. 5. Obeliscus hymneæformis.*
- Fig. 6. Subulina Purcelli.*
- Fig. 7. — strigilis.*
- Fig. 8. Hypolysia Florentiæ.*
- Fig. 9. Fauzulus (Anisoloma) McBeanianus.*
- Fig. 10. Pupa endoplax.*
- Fig. 11. — ridibunda.*
- Fig. 12. Curvella caloglypta.*
- Fig. 13. Buliminus (Rhachis) dimerus.*
- Fig. 14. Melampus ordinarius.*

#### XLII.—On the Breeding-habits of *Chromis philander*.

By NENDICK ABRAHAM.

THE fact that African Chromids take care of their ova and of the young for some time after hatching has been ascertained by several observers—first by Lortet\* on *Ch. simonis* from the Lake of Galilee, then by Max Weber† on *Ch. philander*,

\* Compt. Rend. v. 1875, p. 1196.

† Zool. Jahrb. x. 1897, p. 148.

a Natal species, and recently by Boulenger \* on *Ch. nilotica* and two species from Lake Tanganyika (*Ectodus* and *Tropheus*). Probably this habit will be found common to all the African members of the family. The male has been found to undertake the duty of protecting the young in some species, the female in others. In a letter which I received from Mr. Nendick Abraham, of Durban, my correspondent gives a detailed account of his observations on a Natal species, of which he sent to me also several specimens. I have no doubt that this species is identical with Professor Max Weber's *C. philander*. One of the specimens sent is the individual which Mr. Abraham had under observation for some weeks, and is a male. The following notes are extracted from his letter.

[A. GÜNTHER.]

"In the month of November of 1900 I visited a pond in the neighbourhood of Durban and received several Chromides. I introduced them into a tank prepared for them and kept careful watch. I at once noticed that one of these fish showed indications of carrying ova in its mouth. The gill-covers did not fit closely over the cavity containing the gills, but were distended, making the fish look as though it had a swollen head. This fish I removed into another 'tank,' of which it became the sole occupant. This little fish measured two inches and three quarters in length including the tail. The tank in which I kept it for observation was a small aquarium measuring eight inches by five, with a depth of water of two and a half inches. A few roots of *Vallisneria spiralis* provided the necessary oxidation of the water. A few days after the fish was introduced into this 'tank' the swelling out of the gill-covers became more marked, until they stood out or remained opened quite a distance from the cavity of the gills. Beyond this feature nothing particular was to be noticed for some days. But after these days a very interesting stage in the development took place. I was enabled to see that the ova had evidently matured, for I could see a number of tiny living forms moving about in the mouth of the parent fish. A slight development also took place beneath the lower jaw of the fish in the shape of an expansion of the membrane, which made more room in the mouth, and reminded one somewhat of the dilatable pouch affixed to the lower mandible of a pelican. This pouch being partly transparent as well as a portion of the head near to it, I was enabled to see fairly well right into the mouth-cavity.

\* Poiss. du Bassin du Congo, p. 394.

“For some minutes nothing could be observed in watching the head of the fish but the rhythmic movement of the lower jaw and gills; but after an interval I could clearly see all the young fish in a great state of commotion, filling the whole front of the mouth with a living pack of minute dark creatures, whose movements reminded one of the ways of tadpoles when huddled together in dense masses, only with this difference, these tiny fish moved with great rapidity. After these creatures had made one of their periodic excursions to the front of their parent’s mouth, they always retreated out of sight to the back, and nothing more would be seen of them for a few minutes, and then there would be another turmoil and mad rush to the front; but none of them ever escaped out of the mouth. I think that these movements might be accounted for on the supposition that as these embryonic fish began to grow they gave the parent fish some inconvenience, and that owing to this the fish was obliged to constantly force his growing family from the pharynx to the front of the mouth, giving (him) an opportunity of relieving himself from the choking feeling (he) must have been constantly subjected to. These little fish did not swim to the front of the mouth, but were evidently rushed there, as they looked like a ball composed of a great number of minute wriggling creatures whose real shape could not be seen because of the rapidity of their motion, which was more a revolving motion than any other. I could not see well enough to observe whether they were really fish-like in form or embryonic, and I did not like to disturb the fish enough to find out. I simply kept close watch day after day. These movements continued for some days, during which time I allowed several of my friends to come to my study and witness the strange sight, which was regularly repeated every few minutes.

“After two weeks had passed these movements almost ceased for a time, and I had fears that all was not going well; but after careful watch for a few more days I entered my study early one morning, and to my great delight saw a large number of little fish, very perfect and beautiful, slowly and gracefully swimming about near to their parent’s head—their movements now being very different from the wriggling hurry-scurry which marked their movements prior to their leaving for the first time their parent’s mouth. I tried to count the number of young in this shoal so strangely brought into the world. I counted sixty for certain, but there were probably two or three more. And now being anxious to prove the assertion that the parent fish among the



Chromides take their young into their mouths, I called into my study some of my family, and asked them to watch what happened when I revolved the table-top upon which the aquarium was standing. Half a turn of the revolving top was sufficient: the whole shoal quickly gathered about the parent's head; he opened his mouth, and into it swam the sixty little fish, leaving us to wonder what had become of them. It was a wonderful sight and made a vivid impression upon my mind. It is difficult to describe such a sight, one must see it to appreciate it. Swiftly, but in perfect order and with great grace, all the young swam into the open mouth of the parent and disappeared. I ascertained that they measured a little more than one third of an inch in length. The parent fish, as I have said, only measured two and three quarter inches, yet he found room to pack away in his throat over sixty young, each measuring a third of an inch in length. Once safely within his mouth, he did not let them out again for several hours, and then I was fortunate enough to see him expel them. Two or three were first thrown out of the mouth (shot out as a smoker puffs out smoke from his mouth). Then a few more were thrust out, until nearly thirty were swimming about; then with a circular motion he scattered all the rest almost simultaneously into the larger world of water contained in the tank.

"Now that the young fish were out the parent fish watched over them. I had introduced two freshwater shrimps into the tank a few days before. The fish had taken no notice of them, but now the jealous parent chased these poor shrimps up and down the tank in such a savage way that I had to take them out. I may add that whenever I wanted to see the young fish swim into their parent's mouth it was only necessary to make some slight disturbance on the table, and at once the beautiful and strange scene was enacted. After two or three days the little fish began to venture to the extreme limits of the aquarium hunting for food; and now, when danger was near, the parent fish did not wait for the fry to come to him—in fact, they did not seem quite so eager to be swallowed as at first,—but *he went after them*, gathering them up one by one from all parts of the tank until every one was safe within his mouth. Each evening also, at about sundown, all the young fish were gathered up and kept in the mouth all night. I did not watch all night, but when I looked during the night I could never see any of the fish about; so I concluded he never let them out after collecting them at sundown until the next morning.

"The young fish began to grow not only in size but in

independence, and after five days from their first exit the parent fish treated them as though the time had come for them to look after themselves; and soon after he took no further trouble with them, except in the way of fighting any supposed enemy that was introduced into the tank.

"I may add that I have since observed other fish, with the same result: I mean, of course, other Chromides."

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XLIII.—*The Nomenclature of European Helices.*

By HENRY A. PILSBRY, Sc.D.

PERSONS acquainted with the literature of European land-snails are aware that during the last century an almost incredible number of generic and subgeneric names were bestowed upon the Helices. Up to this time hardly two authors can be found who use the same set of generic names for these mollusks, save perhaps those who adhere to Lamarckian simplicity.

When writing my book upon Helices\*, I found that there was no standard or established classification or nomenclature; and while the formulation of a new and, I believe, phylogenetic classification was what chiefly interested me, I thought it also essential that the nomenclature be placed upon a secure basis. My results, so far as classification is concerned, have met with some approval from those best qualified to judge; but various protests have been made against the changes in generic nomenclature. The appearance of a criticism of some seventeen pages' length, from the pen of the well-known German conchologist Dr. O. von Möllendorff†, calls for the reply which I have not felt needful in the case of less conspicuous criticisms. Controversy over names is a notoriously barren employment.

Dr. v. Möllendorff rightly reports that in bringing together a number of old sectional and group names under a single generic head, I have selected for such generic name that of the oldest-published group involved. This principle, he goes on to say, is in his opinion to be discarded (1 *a*) if the oldest group-name is based upon an extreme form of the genus, in which case he would select a later name for the genus, and one based upon a species of medium development for the

\* "Guide to the Study of Helices," *Manual of Conchology*, (2) ix. (1894).

† "Ueber einige Nomenclaturfragen," in *Nachrbl. d. D. malak. Gesellsch.*, December 1900, pp. 161-178.

group; (1 *b*) it is premature to follow the strict rule of priority when the earliest name was based upon a species not positively known to belong to the genus as built up; (2) the rule of giving page-priority in the case of two or more names for the same group, appearing in one book, he does not recognize, but would select the supposedly most typical from among such names; (3 & 4) after discussing the question of names applied to composite groups, such as those of almost all old authors, Dr. v. Möllendorff states that he considers a generic name preoccupied only when a prior homonym is actually in use.

To these proposed exceptions to the strict rule of priority I would reply that any exception gives opportunity for those individual differences of opinion which it is the sole purpose of rules of nomenclature to obviate. Exception (1 *a*) opens the door to endless discussion as to what is or is not an aberrant species. To my mind the examples cited by von Möllendorff are not such. Thus, *Helicigona lapicida* is typical of its genus in soft anatomy, and aberrant in a single character of the shell alone, *i. e.* the carination. Is a specific character of this sort enough to cause us to disregard the rule of priority? And, then, who is to decide upon what is the natural type of a genus? for here theoretical considerations will rule. I grant the force of the objection no. (1 *b*); it applies, however, to no European Helicidæ. Regarding exception (2) it should be said that if page-priority be rejected there is absolutely no rule to cover cases of two or more names for one group in one book. I therefore hold that, as Jordan says, "in case of twins, primogeniture controls." Objection no. (4) seems to me to be wholly impossible of application. How are we to tell whether a name proposed in Coleoptera, for instance, will not become a valid genus, even if now temporarily relegated to synonymy? We are constantly taking up and using names long supposed to be synonyms. The concrete cases discussed by v. Möllendorff are as follows:—

*Xerophila, Helicella.*

This is a case of unusual difficulty, from the fact that all the early authors placed the species of the modern genus in company with many really diverse forms. Whether I took the best course in using the name *Helicella* remains open to doubt. At all events, the supposed use of that name, prior to Férussac, alleged by von Möllendorff, is easily disposed of. In his 'Extrait du Cours de Zoologie,' 1812, p. 115, Lamarck enumerates the genera of Colimacés—*Hélice*,

*Helicelle*, *Helicine*, *Maillot*, &c.,—but defines none of them, and gives no Latin names. Blainville, in his 'Manuel' of 1825, also mentions *Helicelle*, Lam., for *Helix obvoluta*, but he too fails to Latinize the French vernacular name. This leaves the way clear for Risso's restriction of *Helicella*, Fér., in 1826.

However, the real point is that we do not know the date of Férussac's 'Prodrome' with certainty, while I have shown that Gray in 1821 proposed the name *Jacosta* for a species of the genus\*. It may well prove that in this case my decision will require revision or reversal; but if so, the name in common use, *Xerophila*, can in no case be used for the group, as it dates from 1837.

### *Hygromia*, *Fruticicola*, *Trichia*.

Dr. von Möllendorff agrees with me that *Hygromia* should stand for the genus commonly known under one or other of the above names; but he prefers Férussac's form *Hygromanus*. As I have elsewhere held, this was intended for a noun in the plural and is not acceptable, besides being a heterogeneous section never yet restricted. I therefore adhere to Risso's name *Hygromia*.

Regarding the use of the subgeneric term *Trichia*, I would say that *Trichia*, de Haan, bears the date of 1841, not 1850, as von Möllendorff seeks to prove†. This leaves the priority with *Trichia*, Hartmann, 1840. But it seems to me that *Fruticicola* of Held, 1837, should have preference on account of its earlier date. Von Möllendorff states that the first species of *Fruticicola* was *fruticum*, Müll., "Erste Art ist *fruticum*, Müll., so dass eigentlich *Fruticicola* für *Eulota* einzutreten hätte"; but had the original article by Held in the 'Isis' been consulted, it would have been seen that *fruticum* is not the first but the *seventeenth* species in Held's list. As *H. fruticum* was eliminated from the group by Hartmann three years later, the misgivings expressed by von Möllendorff lest I should unsettle the name *Eulota* are groundless.

One of the very few cases where I could not consult an original work, and quoted at second-hand, was in the use of Schlüter's name *Perforatella*. I procured the original work a year or two ago, and find that Westerlund, whom I

\* Cf. Man. Conch. ix. p. 258, and Proc. Acad. Nat. Sci. Philad. 1897, p. 359, under *H. chionobasis*.

† The Crustacea of the 'Fauna Japonica' appeared in parts, the first issued in 1833, the last in 1850. *Trichia* was in "*decas quinta* 1841" (p. 109). The dates are printed at the foot of the first page of each fascicle.



followed, was wrong; and the re-arrangement tabulated by von Möllendorff (p. 171) is to be substituted for mine.

### *Helicodonta, Gonostoma.*

Any attempt to overthrow *Helicodonta* in favour of *Gonostoma* will be seen to be futile when it is really understood that (1) *Helicodonta* of Férussac, proposed for Helices with toothed or sinuous mouths, was restricted by Risso, in 1826, to the single species *obvoluta*; and (2) *Gonostoma*, Held, 1837, is preoccupied by *Gonostoma*, Rafinesque, 1810, a name in common and accepted use by ichthyologists (see Günther, 'The Study of Fishes,' p. 629, 1880). There is a genus *Helicodon* in the Tankerville Catalogue, p. 35 (1825), which includes species of *Polygyra*, *Sagda*, *Anostoma*, *Cepolis*, and *Pleurodonte*.

### *Campylæa, Helicigona.*

It is admitted that my use of *Helicigona* for the *Campylæa* group of Europe is justified, but von Möllendorff contends that Mörch deserves the credit for such use. This may be true: Mörch was a good and great conchologist in his day and generation, and I am only sorry that he did not convince everybody that they should adopt *Helicigona*. It is claimed that I erred in putting the carinated *H. lopicida* in a section by itself, whereas it should be included with the unkeeled *H. cornea*. This is a matter of opinion, upon which no one could wish to dogmatize; but one would not suppose that a writer who considers *Plectotropis* a distinct genus from *Ægista* on account of the keel (there are no anatomical differences) would criticize the course I have taken.

In conclusion, von Möllendorff suggests that, in pursuance of his rule no. 3, the genus might be called "*Campylæa* (Beck) v. Iher." This course would oppose the rule of priority, and is further open to objection from the fact that v. Ihering included the American *Epiphragmophora* species in *Campylæa*, although I have shown that they are widely different anatomically.

### Section *Otala*, Schumacher, 1817.

After some discussion of the limits of this group and of my use of the term *Otala*, Dr. von Möllendorff has cast doubt upon what I expressly and, I think, advisedly stated to be the facts in the case. I said ('Manual,' p. 323): "The name *Otala* was proposed for three species, placed in two sections. Section *a* contained *hamastoma* (which being the

type of a prior genus must be eliminated) and *atomaria*, a new name for *lactea*, Müll. Section *b* contained the *Helix sulcata* of Müller, a form which Swainson, in 1840, made the type of his group *Plicadomus*. These eliminations leave *H. lactea* the valid nucleus of Schumacher's group. . . . Beck's use of *Otala* has no bearing upon the case, as he included none of Schumacher's species in his group."

Against this von Möllendorff quotes from Herrmannsen and Beck, as he had not seen Schumacher's work; and after further remarks concludes to use the name *Marmorana*, Hartmann, for the group, placing "*Otala*, Pilsbry," as a synonym thereto.

This conclusion cannot, however, be maintained, since *Marmorana* was based upon the species *serpentina*, which belongs *not to the group under discussion*, but to *Iberus*. Hartmann's sole reference to *Marmorana* is the passage (*apropos* of a certain malformation) which reads: "Herr Graf Porro hielt sie für sehr merkwürdig und sandte mir mehrere solche von unserer *Euparyphia*, auch von *Marmorana serpentina*; wirklich ist die Ursache dieser abnormen Fortsetzung schwierig zu ermitteln," &c. Thus was *Marmorana* established. And von Möllendorff gravely concludes: "Danach würde *Marmorana* auf die Formenkreise von *vermiculata* und *lactea* zu beschränken sein"!

#### XLIV.—Some Questions of Myriopod Nomenclature.

By R. I. POCKOCK.

##### 1. *Leach's Species of the Genus Geophilus.*

THE genus *Geophilus*, Leach, originally contained the following species:—*carpophagus*, *subterraneus*, *acuminatus*, *longicornis* (Tr. Linn. Soc. xi. pp. 384–386, 1819). One of these must be the type of the genus. *Longicornis* was taken out by Newport (Proc. Zool. Soc. 1842, p. 180) as the type of *Necrophlæophagus*. In 1845 (Tr. Linn. Soc. xix. p. 429 &c.) Newport substituted *Arthronomalus* for *Necrophlæophagus*, and added the following species:—*punctiventris*, *carpophagus*, *similis* (= *carpophagus*), *Hopei*, *flavus*, and *opinatus*. Since Newport expressly states that he changed *Necrophlæophagus* for *Arthronomalus*, the two must be regarded as synonymous in the strictest possible sense of the term—that is to say, as having the same type species. It is superfluous, therefore, to pursue further the fate of the remaining species included under *Arthronomalus* with a view to ascertaining if one of

them can stand as its type. It may be added, however, that *carpophagus* was eliminated by Meinert in 1869 (Nat. Tidskr. iv. p. 97) under the name *sodalis* as a *Scnipæus*, of which it may be regarded as the type if *Scnipæus* is ever restored to use. Thus two of the species upon which *Geophilus* was primarily based are accounted for, and neither can be recognized as its type according to the "elimination" system. What, then, becomes of the generic name? Since neither of the two just mentioned is available, it must fall upon either *acuminatus* or *subterraneus*, and to them it was applied by Newport in his classical monograph (Tr. Linn. Soc. xix. pp. 434-438, 1845). But *acuminatus* was removed by C. Koch under the name *rosulans* as *Linotænia* (Syst. Myr. S. 188, 1847). Hence *subterraneus*, being the last species left in the genus *Geophilus*, comes out as its type; and since *subterraneus* is probably congeneric with *gracilis*, Meinert, the type of the genus *Stigmatogaster* of Latzel, *Stigmatogaster* becomes a synonym of *Geophilus*.

The four species, then, which originally constituted the genus *Geophilus* must now be associated with the following generic names, whether or not the names take the rank that was primarily assigned to them:—

*Necrophlæophagus*, Newport (= *Arthronomalus*, Newp.).

Type *longicornis*, Leach.

*Scnipæus*, Meinert.

Type *carpophagus*, Leach (= *sodalis*, Mein.).

*Linotænia*, Koch.

Type *acuminata*, Leach (= *rosulans*, Koch).

*Geophilus*, Leach (?= *Stigmatogaster*, Latz.).

Type *subterraneus*, Leach.

The adoption of the conclusions here stated involves two further changes in nomenclature, namely, the transference of the family name Geophilidæ to the group designated Himantariidæ by Cook, and the introduction of a new name for the group which currently passes as Geophilidæ. Necrophlæophagidæ obviously suggests itself for this purpose, in spite of its polysyllables and cacophony.

## 2. The Genera of *Blaniuloid* *Diplopods*.

In 1836 (Bull. Soc. Philom. p. 72) Gervais established the genus *Blaniulus* for the reception of the blind *Iulus guttulus* (Bosc), Fabricius, with which he rightly declared *Iulus*

*pulchellus* of Leach to be synonymous. *Guttulatus* therefore is the type of *Blaniulus*.

In 1851 a second genus, namely *Nopoiulus*, was introduced by Menge (Neueste Schr. Ges. Danzig, iv. pt. 4, no. ii. p. 7) for a species named *punctulatus*, differing from the type of *Blaniulus* in possessing a row of seven eyes on each side of the head. *Punctulatus* therefore is the type of *Nopoiulus*. This genus, however, dropped out of use as a synonym of *Blaniulus*, and was forgotten by the authors who have busied themselves with the Blaniuloid genera.

In 1898 Dr. Verhoeff found that *Blaniulus*, in the comprehensive sense recognized by Meinert, Latzel, and their successors, can be divided, mainly by the structure of its copulatory organs, into three genera, which are named *Typhloblaniulus*, for *guttulatus* and *troglobius*; *Trichoblaniulus*, for *hirsutus*; and *Blaniulus*, for *venustus*, *palmatus*, and *Phlepsii*. From the standpoint of nomenclature, however, this classification is open to obvious criticism. In the first place, since *guttulatus* is the type of *Blaniulus*, *Typhloblaniulus* must be a synonym of *Blaniulus*, and the latter cannot be assigned to the species typified by *venustus*. In the second place, since *venustus* is recognized as identical with *punctulatus* of Menge, the type of *Nopoiulus*, *Blaniulus* as restricted by Dr. Verhoeff is nothing but *Nopoiulus* of Menge (see Archiv f. Naturgesch. 1898, p. 172).

A fourth genus was introduced by Silvestri (Bull. Soc. Ent. Ital. xxix. p. 24, 1897), namely, *Proteroiulus*, for *Blaniulus fuscus*, Stein.

Hence the genera of this group will stand as follows :—

*Blaniulus*, Gervais (= *Typhloblaniulus*, Verh.).

Type *guttulatus*, Bosc.

*Trichoblaniulus*, Verhoeff.

Type *Blaniulus hirsutus*, Bröl.

*Nopoiulus*, Menge (= *Blaniulus*, Verh., nec Gervais).

Type *Iulus Kochii*, Gervais (= *pulchellus*, Koch nec Leach, *punctulatus*, Menge, and *venustus*, Meinert) \*.

*Proteroiulus*, Silvestri.

Type *Blaniulus fuscus*, Stein.

\* Latzel's reasons for calling this species *venustus* are not clear, since both *Kochii* and *punctulatus* are older names and antedate it in the list of synonyms given in that author's classical work.



## BIBLIOGRAPHICAL NOTICE.

*Our Country's Shells, and how to know them. A Guide to the British Mollusca.* By W. J. GORDON. With a Coloured Illustration of every Species and many Original Diagrams by A. LAMBERT. London: Simpkin, Marshall, Hamilton, Kent, & Co. 8vo. Pp. 152; 33 Plates. Price 6s.

As stated in the Introduction, "this book is intended as an introductory working manual for the collector, the object of its analytical tables being to enable him to name any specimen in the British list." The question is, does the work fulfil this object? In many instances certainly not, the illustrations being so crude that we do not get even a faint idea of the species supposed to be delineated. The figures of some of the larger bivalves, as might be expected, are fairly characteristic, but the smaller forms are less successful. Turning to the univalves, where accurate drawing and perspective are necessary, we meet with very many hopeless failures—in fact, such caricatures, that we are surprised the artist (!) should have permitted his name to appear.

Turning to the text, we candidly confess we do not like the method of it. In the first place, the descriptions are very superficial and insufficient. As an example reference should be made to the paragraph upon Brachiopods (p. 41) and the characters which are supposed to differentiate the genera. The reader, unless he has an idea of what a Brachiopod is like, will certainly not gain that knowledge from this work. Some of the descriptions are very remarkable: for instance, *Capulus* is said to be "a stout, sturdy, independent sort of a shell." What does it mean? "*Tectura* is like the roof of a house, *Helcion* like a lady's bonnet"!

Referring to the tabular scheme, we find it very difficult to make use of it, and much time might be wasted in trying to identify a shell by it. The nomenclature employed is absurdly antiquated, and it is quite time that the names used by Gwyn Jeffreys were discarded. For example, under *Pleurotoma* are ranged fourteen species, which, according to modern accepted ideas, should be placed in six genera; and under *Mangilia*, also belonging to the *Pleurotomidæ*, seven species occur which belong to three different genera, not one of them being a true *Mangilia*. One or two other examples will be sufficient. On p. 119, under *Fusus*, of which the British Isles do not produce a single species, nine species are ranged, which, according to modern nomenclature, should be placed in five distinct genera. The British *Chitonidæ* also should be ranged under six genera, instead of *Chiton* only, which is not represented in the British fauna. As a picture-book this work is more or less a failure, and as a descriptive account it is often too brief and very puzzling in its arrangement. But perhaps we expect too much at the price.

## MISCELLANEOUS.

*Dates of Publication of the Zoological and Botanical portions of some French Voyages.*—Part II. Ferret and Galinier's '*Voyage en Abyssinie*'; Lefebvre's '*Voyage en Abyssinie*'; '*Exploration scientifique de l'Algérie*'; Castelnau's '*Amérique du Sud*'; Dumont d'Urville's '*Voyage de l'Astrolabe*'; Laplace's '*Voyage sur la Favorite*'; Jacquemont's '*Voyage dans l'Inde*'; Tréhouart's '*Commission scientifique d'Islande*'; Cailliaud, '*Voyage à Méroé*'; '*Expédition scientifique de Morée*'; Fabre, '*Commission scientifique du Nord*'; Du Petit-Thouars, '*Voyage de la Vénus*'; and on the Dates of the '*Faune Française*.' By C. DAVIES SHERBORN, F.Z.S., and B. B. WOODWARD, F.L.S. &c.

[Continued from p. 164.]

'Voyage de . . . l'Astrolabe . . . pendant . . . 1826-29, sous le commandement de M. J. DUMONT D'URVILLE, &c.'

BOTANIQUE. Pt. I. Essai d'une Flore &c. Par Richard.

The text to this part was published 5 May, 1832 (Bibl. Franç.).

— Pt. II. Sertum Astrolabianum. Par Richard.

The text to this part was published 1834.

ZOOLOGIE. T. I. pt. 1. L'Homme, Mammifères, Oiseaux. 1830.

The Bibl. Fr. distinctly quotes this vol. as published 5 May, 1832, but we consider that to be a misprint for vol. ii. pt. 1, which has the same number of pages. It is, however, curious to note that not one of the new species of birds in this work is cited in Lesson's '*Traitez d'Ornithologie*,' 1831.

— T. I. pt. 2. [Not published.]

T. II. & III. Mollusques (Poissons).

II. (1) pp. 1-320. 1832. [After Faune Ent. pt. 1.] Wrapper dated 1833. Bibl. Franç. 5 May, 1832.

(2) 321-686. 1833.

III. (1) 1-366. 1834.

(2) 367-954. 1835 (p. 954 dated 17 Mars 1835).

T. IV. Zoophytes. 1834.

FAUNE ENTOMOLOGIQUE.

Pt. 1. Lépidoptères. 1832 [and before vol. ii. pt. 1].

The first livraison was received by the Soc. Ent. Fr. 4 April, 1832, and seems to have been plates only, for the second livr. is announced 7 Nov. 1832, with the first part of the text relative thereto (Ann. Soc. Ent. Fr. tom. i. pp. 231 & 424).

Pt. 2. Coleoptères. 1835 (avertissement dated "Février 1835").

See also Duperry, '*Voy. Coquille*,' Zool. ii. (2) pt. 1, p. 271. The Soc. Ent. France received it 3 June, 1835 (cf. Ann. tom. iv. p. xlv), but a separatum under the title '*Faune de l'Océanie*,' was advertised by them as published before April (cf. tom. cit. p. xxxv).

'Voyage autour du Monde . . . sur . . . la Favorite . . . sous . . . M. LAPLACE.' (Reprinted, with some additions, from the '*Magasin de Zoologie*' for the years cited.)

Vol. V. ZOOLOGIE.

Rapport . . . sur les Collections. By De Blainville. Pp. 1-16 [new matter?].

Pt. 1. Marsupiaux. By Eydoux & Laurent. 17-80. 1837.

81-195. 1838.

Pt. 2. Mammifères. By Eydoux & Gervais. 1-26. 1836.

[27]. New matter.

Ann. & Mag. N. Hist. Ser. 7. Vol. viii.

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Vol. V. ZOOLOGIE (*con.*).

Oiseaux.	By Eydoux & Gervais.	29-63.	<b>1836.</b>
Phytotoma.	"	64 <sup>b</sup> -64 <sup>a</sup> .	New matter.
Reptiles.	"	65-76.	} <b>1837.</b>
Poissons.	"	77-80.	
Insectes.	By Guérin-Ménéville.	81-168.	} <b>1838.</b>
Crustacés.	"	169-176.	
Myriapodes.	By Eydoux & Gervais.	77-180.	
Mollusques.	By Eydoux.	181-192.	

[Published in one vol. (vol. v.), with "new matter" and index, in 1839 (Wieg. Arch. 1841, ii. 34).]

Lépidoptères nouveaux. By Feisthamel. Pp. 1-30. Ann. Soc. Ent. Fr. 6 May, 1840, p. xix.

[All the new species in this part were described and figured in the Mag. de Zool. for 1839.]

‘Voyage dans l’Inde, par V. JACQUEMONT, pendant les années 1828 à 1832.’

## Tome IV. Description des Collections.

Mammifères. Par Isidore Geoffroy Saint-Hilaire.

Crustacées. Par [H.] Milne-Edwards.

Insectes. Par M. É. Blanchard.

Plantæ rariores . . . Auct. J. Cambessèdes.

" " . . . Auct. J. Decaisne.

The work was issued in 54 livraisons, of which no. 1 appeared April 1835 (*‘L’Institut,’* p. 109), the last in Dec. 1844 (*C. Rendus*, 1844, p. 1407). The descriptions of mammals and birds by Isidore Geoffroy Saint-Hilaire came out between livraisons 45 and 46 (*sic*), and was announced in May 1843 (*C. Rendus*, 1843, p. 1015).

Mamm. **1843.** Wieg. Arch. 1844, ii. 164, said to have formed livr. 46 & 47.

Plates, 1844. *Op. cit.* 1846, ii. 121.

Crustacea and Insecta. **1844.** Wieg. Arch. 1846, ii. 197, 309.

Plants (by Cambessèdes & Decaisne). **1844.** Wieg. Arch. 1845, ii. p. 376.

‘Commission scientifique d’Islande et de Groënland. Voyage en Islande et au Groënland exécuté pendant . . . 1835-36 sur . . . la Recherche, commandée par M. TRÉHOVART.’

Zoologie et Médecine. Par M. E. Robert. Pp. iv, 211. **1851.**

Minéralogie et Géologie. Par M. E. Robert. Pp. 468.

Livr. 1. 20½ sheets, pp. xii & 1-328. Bibl. Franç. 26 Dec. **1840.**

2. 9 329-468. " 11 Dec. **1841.**

[This livr. 2 contains a list of Icelandic plants by J. Vahl.]

F. CAILLIAUD. ‘Voyage à Méroé.’

Text, 4 vols. 8°.

I. **1826.** Bibl. Franç. 27 May, 1826.

II. **1826.** " 21 June, 1826.

III. **1826.** " 27 Jan. 1827.

IV. **1827.** " 15 Sept. 1827.

Plates, in 30 livraisons.

Livr. 1-3. 1823.

4-16. 1824.

17-25. 1825.

26-29. 1826.

30. 1827.

## 'Expédition scientifique de Morée.'

Tom. I. Relation, 1836.

II., pt. 1. Géographie, 1834. Pt. 2. Géologie et Minéralogie, 1833.

III., pt. 1. Zoologie: Sect 1, Animaux Vertébrés (+Mollusques and Polypiers), 1833; Sect. 2, Animaux Articulés, 1832.  
Pt. 2. Botanique, 1832; Planches (4 séries), 1835.

The whole work appeared in 39 livraisons of text (each livr. having an average of 6 sheets) and upwards of 30 of plates; but the plates do not seem to have always been issued apart. The titlepages were evidently issued with the first part of each section, and the several sections made their appearance in the inverse order to that which they occupy in the completed work. The first livraison of plates appeared 25 Feb., 1832 (Bibl. Fr.). Livr. 1-16 (93 sheets) of text were out by 8 June, 1833 (*op. cit.*).

The exact contents of these we have not been able to ascertain, but the Botany and Articulata were among the first, and followed probably by the Vertebrata. The dates of presentation of the eight parts of Articulata (by Brullé and Guérin) and some plates to the Société Entomologique de France are ascertained from the society's 'Annales' to be as follows, though their exact contents are still unknown:—

Pls. xxix., xxxii., & xxxix.	[Between Jan. & Apr. 1832.]	Ann. tom. i. p. 116.
Text. Pt. 1 & 2 [=? pp. 1-96].	5 Sept. 1832.	" " i. pp. 314 & 243.
3 [=? pp. 97-144].	3 Oct. 1832.	" " i. p. 423.
4 [=? pp. 145-192].	[Between July & Oct.] 1832.	" " i. p. 334.
5 & 6 [? pp. 193-288].	9 Jan. 1833.	" " ii. p. i.
7 [? pp. 289-336].	20 Mar. 1833.	" " ii. p. ix.
8 [? pp. 337-end].	3 April, 1833.	" " ii. p. xxxv.
Two plates.	1833.	" " ii. p. xxxix.
Pls. xxxi., xliii., xlv., xlvii., & liii.	1834.	" " iii. p. lxxvii.
xl., xli., xlv., & xlix.	1835.	" " iv. p. cxi.
xxvii., xlviii., l., li., & lii.	1836.	" " v. p. lxxxiii.

Concerning the times of publication of livr. 17, 18, and 19 we have no trace; the remaining portions appeared as follows:—

Livr.				
20. 20 v. 33.	Institut, tom. i. p. 9		{ Pt. 1, pp. 1-48.	Bull. Soc. Géol. Fr. t. iii. p. 298.
21. 10 vi. 33.	" " 33	{ Géol. & Min.	2, 49-64.	" " " 314.
22. 24 vi. 33.	" " 49		3, 65-104.	" " " 349.
23. 5 viii. 33.	" " 105		4, 105-208.	" " " t. iv. p. 82.
24. 9 ix. 33.	" " 153		5	
25. 14 x. 33.	" " 193.	Last part of "Botanique" ('Flora,' 1833, p. 730).		
26. 23 xii. 33.	" " 273	{ Géol. & Min.	{ Pt. 6, pp. 209-256.	Bull. Soc. Géol. Fr. t. iv. p. 154.
27. 24 ii. 34.	" tom. ii. p. 69		7, 257-304.	" " " 324.
28. 24 iii. 34.	" " 101		8, 305-375.	" " " t. vi. p. 69.
29. 30 vi. 34.	" " 213	{ "Géographie."		
30. 8 ix. 34.	" " 297			
31. 1 xii. 34.	" " 393.			
32. 6 iv. 35.	" tom. iii. p. 109.			
33. 20 vii. 35.	" " 233.			
34. 10 viii. 35.	" " 257.			
35. 12 x. 35.	" " 329.			
36. 23 xi. 35.	" " 377	{ "Travaux de la Section des Sciences physiques; in folio"		
		[=last part of the Atlas].		
37. 25 i. 36.	" tom. iv. p. 27	{ "Relation." See letter on back of dedication of Chaubard &		
38. 28 iii. 36.	" " 99	Bory de St. Vincent's 'Nouv. Flore Pélop.,' 1838.		
39 & last	{ 18 iv. 36.	" " 123	{ One of the plates in livr. 37 was Bot. xxxvii. bis.	



We can approximate the dates as under :—

**BOTANY;** 1832–33. By Fauché, Chaubard and Bory de Saint Vincent, and A. Brongniart.

How much appeared in each year is not exactly ascertainable, but pp. 345–6 were utilized in the review in ‘Flora,’ 1833, p. 730, and the concluding article in the volume by Brongniart was published in ‘Institute,’ tom. i. p. 157 (Sept. 1833), and also in Ann. Sci. Nat. tom. xxx. p. 168 (Oct. 1833).

From computation it appears likely that pp. 336 or the bulk of the work was out in 1832.

**ZOOLOGY.** Sect. 1. Des Animaux Vertébrés : Mammifères et Oiseaux (to which are pagéd on “Reptiles,” “Mollusques,” and “Polypiers”).

No direct evidence is obtainable, but we are inclined to the opinion that the portion dealing with the Vertebrata all appeared in 1833.

The portion “Mollusques and Polypiers” we take to be 1835, for on pp. 231–2 of the Partie Géologique, which was published in Dec. 1833, there is a list of shells by Deshayes with names (only) of new species and references to [sér. ii.] pls. i.–vii. ; in the “Mollusques” these species are fully described, but the plates are there cited as [sér. iii.] xx.–xxvi., and though in the Natural History Museum copy these plates are not re-lettered, the latter numeration is assigned to them in the “Ordre des Planches” in the Atlas (1835). Moreover, the author refers throughout to the first edition of Lamarck’s ‘Hist. nat. Anim. sans Vert.,’ and not to the second edition, edited as to the Mollusca by himself, which portion began to appear in 1835 (vol. vi. was presented to the Paris Academy 30th March, ‘Institut,’ tom. iii. p. 101). On the other hand, the first one of Deshayes’s new species from the Morea that is cited in Lamarck, ed. 2, is *Terebratula inflexa* (Expéd. Morée, tom. iii. pt. 1, p. 129; Anim. sans Vert. éd. 2, tom. vii. 1836, p. 359, which volume was presented to the Paris Acad. 13 Jan. of that year).

As will be evident from the table above given, this section could not have begun before livr. 31 (Dec. 1834), and since there is only text enough to form three parts, though the whole work was not presented to the Paris Academy till 16 May, 1836 (Compt. Rend. tom. ii. p. 44), we incline, from the evidence above given, to 1835.

**ZOOLOGIE.** Sect. 2. Des Animaux Articulés.

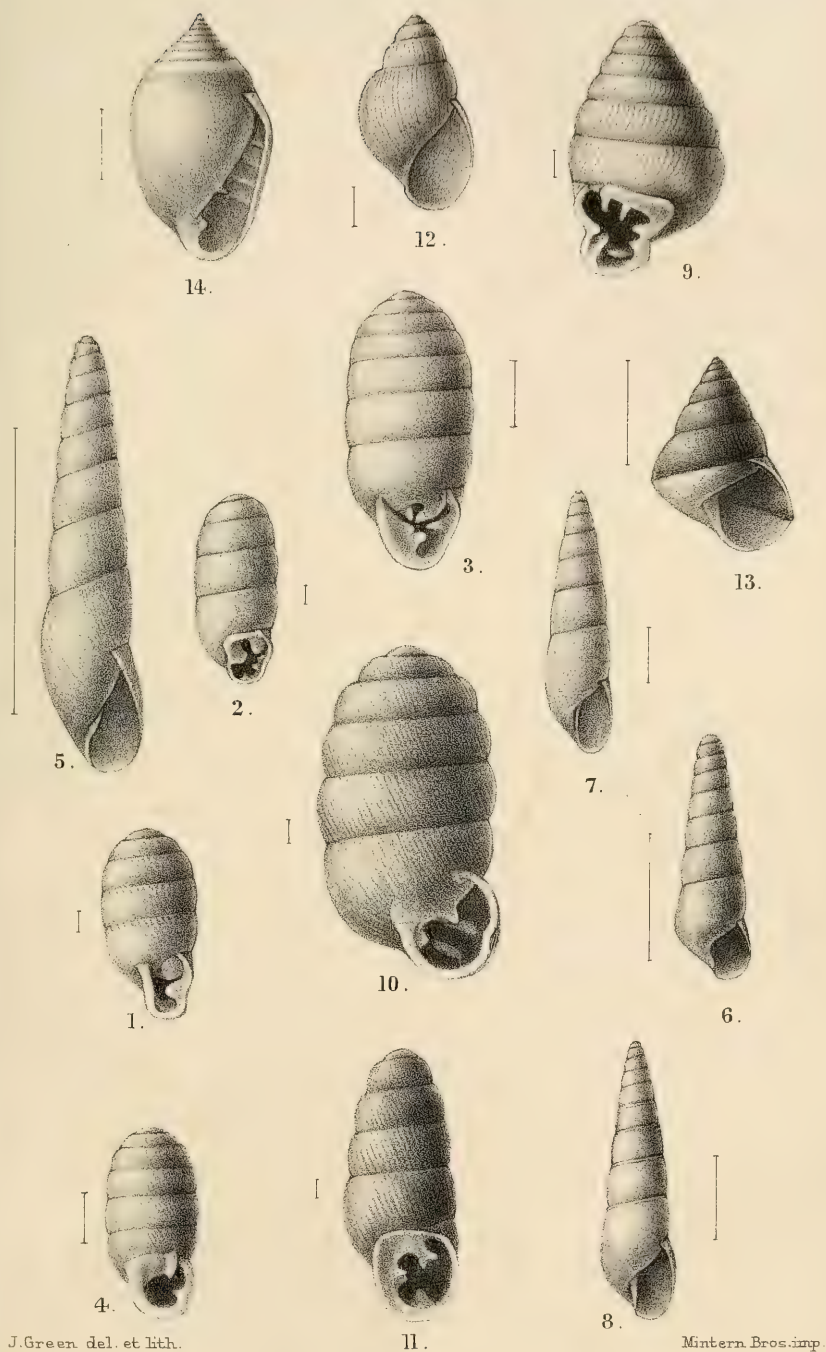
Applying the rule of 6 sheets to a part, the first six parts would contain pp. 1–288, or as far as the end of “Lépidoptères,” where there is a manifest break in the text; and since pts. 5 & 6 were presented to the Soc. Ent. France at their first meeting (9th Jan.) 1833, they were assumably out in 1832, which is the date we take, the remaining text being 1833.

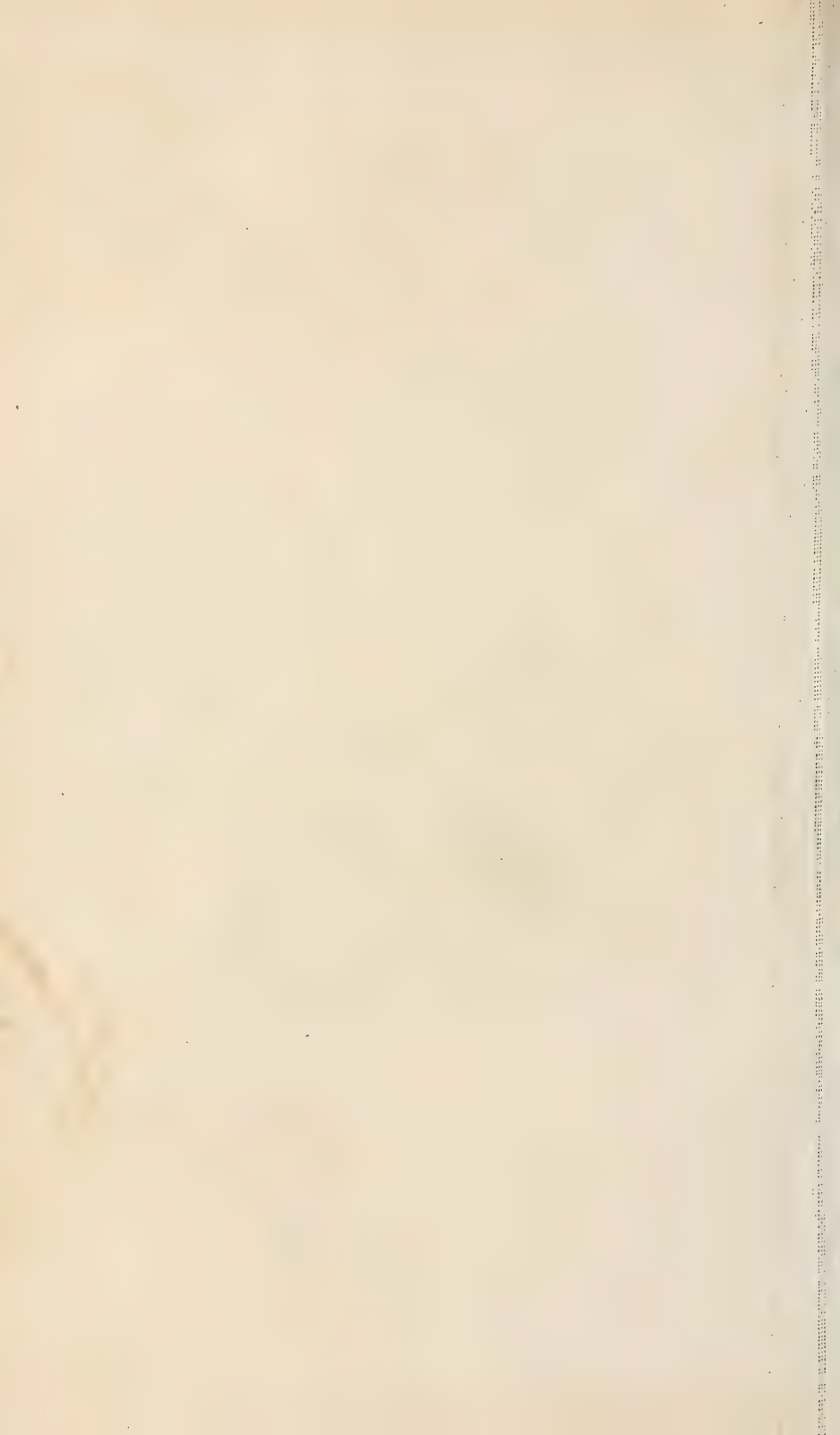
**GÉOLOGIE and MINÉRALOGIE.** By Puillon de Boblaye and Virlet.

From the table it is seen this appeared :—

Pp. 1–256. 1833.

257–375. 1834.





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[SEVENTH SERIES.]

No. 47. NOVEMBER 1901.

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XLV.—*On some Entomostraca collected in the Arctic Seas in 1898 by William S. Bruce, F.R.S.G.S.* By THOMAS SCOTT, F.L.S., and ANDREW SCOTT.

[Plates III.–VI.]

THE Entomostraca recorded here were collected by William S. Bruce, in June and July 1898, while cruising in the Arctic Seas with Mr. Andrew Coats in his steam yacht the 'Blencathra.' These micro-crustracea consisted chiefly of Copepoda; some Ostracoda were obtained, but they comprised only a few moderately common species, while the Cladocera were represented by one or two examples of the ephippia of *Daphnia* sp.

The Copepoda number 59 species in all, and they belong to the following nine families, viz.:—to the Calanidæ, 4 species; the Centropagidæ, 3 species; the Pseudocyclopidae, 1 species; the Pontellidæ, 2 species; the Cyclopidae, 4 species; the Harpacticidæ, 40 species; the Lichomolgidae, 1 species; and the Asterocheridæ, 4 species. It will be observed that the largest number of species (40) belong to the Harpacticidæ; most of them, however, are represented by only a few specimens. On the other hand, the species in the collection represented by the largest number of specimens



was *Calanus finmarchicus*—some of the tow-net gatherings collected by Mr. Bruce consisted almost entirely of this species.

Most of the Copepoda recorded here, with the exception of *Calanus finmarchicus* and a few other pelagic forms, were collected in the neighbourhood of Kolguev, and between that island and Kostyn Point, near the south end of Novaya Zemlia; several species were also dredged in the vicinity of Bear and Hope Islands off the south-east of Spitzbergen, as well as in moderately deep water (100 to 110 fathoms) to the eastward of Hope Island.

The Copepoda from the vicinity of Kolguev and Kostyn Point were collected in June, while those obtained in the neighbourhood of Bear and Hope Islands were collected in July.

The following are the species of Copepoda collected by Mr. Bruce in 1898, so far as they have been identified by us\*.

#### Fam. Calanidæ.

##### *Calanus finmarchicus* (Gunner).

This was by far the most common of the Copepods collected by Mr. Bruce; but though it was present in most of the tow-net gatherings, it was not equally plentiful—in one it might occur in large numbers, while in another, collected perhaps the next day or even the same day, only a few specimens would be observed. It would thus appear that in those parts of the Barents Sea visited by the 'Blencathra' the distribution of this species was not uniform, but that it rather occurred in shoals. It should be noted in passing that most of the tow-net gatherings were collected at or near the surface, so that our remarks apply only to the surface-distribution of the species.

##### *Calanus hyperboreus*, Kröyer.

This species was not observed in any of the gatherings collected in June in the neighbourhood of Kolguev, but it occurred in several of those collected in July. It was, for example, obtained in gatherings from the vicinity of Hope Island, collected on the 5th and 6th; in one collected south-east of South Cape, Spitzbergen (lat. 76° 29' N., long.

\* The Rev. T. R. R. Stebbing, M.A., F.R.S., has already, in Ann. & Mag. Nat. Hist. (7) vol. v. pp. 1-16 (Jan. 1900), published a report on the higher forms of Crustacea collected by Mr. Bruce during his cruise with Mr. Coats on board the s.y. 'Blencathra.'

19° 08' E.), on the 22nd; and in one from Kval Sound, collected on the 24th; but in none of the gatherings was the species very common.

*Pseudocalanus elongatus*, Boeck.

This species occurred in one or two gatherings collected between Kolguev and the neighbouring shores of Novaya Zemlya in June; and in July in the vicinity of Hope Island, in various parts of the Barents Sea, and in Kval Sound, but nowhere very common.

*Pseudocalanus pygmæus*, G. O. Sars.

1900. *Pseudocalanus pygmæus*, G. O. Sars, The Norwegian North Polar Expedition, 1893-96,—Scientific results, edited by Fridtjof Nansen, No. v. Crustacea, by G. O. Sars, p. 73, pl. xxi.

Several specimens of this moderately distinct species were obtained in a gathering collected near the shore on the east side of Kolguev Island on June 12th. A number of other species, such as *Oithona helgolandica*, *Jonesiella spinulosa*, *Platychelipus littoralis*, and *Idya furcata*, were also observed. Prof. G. O. Sars states that *Pseudocalanus pygmæus* "occurred in considerable numbers in samples taken north of the New Siberian Islands in October 1893," and adds that no male specimen was found. With regard to the apparent absence of male specimens noted by Professor Sars, it may be of interest to remark that we also failed to obtain a single male amongst the specimens collected by Mr. Bruce. This absence of male specimens made us at first somewhat doubtful concerning the species to which the specimens observed by us should be ascribed, but after careful examination of them we are satisfied that they are identical with the *Pseudocalanus pygmæus* of G. O. Sars.

Fam. Centropagidæ.

*Centropages hamatus* (Lilljeborg).

The only gathering in which this species was observed was one collected in Kval Sound on the 24th of July—it was a tow-net gathering from near the surface of the water. Only one or two specimens of the *Centropages* were observed.

*Temora longicornis* (Müller).

This species, which is sometimes exceedingly common in the British seas, occurred in the same gathering with the

*Centropages* just recorded. This was the only gathering in which it was observed and a few specimens only were obtained.

*Metridia longa* (Lubbock).

*Metridia longa* appears to be a true Arctic Copepod, and is sometimes moderately abundant in samples of the Copepod fauna of the far north; yet, with the exception of the one from Kval Sound in which the *Centropages* and *Temora* were obtained, the species was observed in none of those collected by Mr. Bruce in June and July 1898 and examined by us, and even in the gathering from Kval Sound only a few specimens were observed.

Fam. **Pseudocyclopidae**.

*Pseudocyclops obtusatus*, Brady & Robertson.

1873. *Pseudocyclops obtusatus*, Brady & Robertson, Ann. & Mag. Nat. Hist. (4) vol. xii. p. 12, pl. viii. figs. 4-7.

This species was dredged on the west side of Bear Island on July 3rd, in moderately shallow water, and was apparently very rare.

Fam. **Pontellidae**.

*Anomalocera Patersonii*, R. Templeton.

1837. *Anomalocera Patersonii*, R. Templ. Trans. Ent. Soc. Lond. vol. ii. p. 34, pl. v. figs. 1-3.

Specimens of this fine species were obtained in a tow-net gathering collected at the entrance to Kval Fjord, and in another from Kval Sound; both gatherings were collected on July 24th.

*Acartia longiremis* (Lilljeborg).

Taken by surface tow-net off Kostyn Point, Novaya Zemlya, on June 17th, off Hope Island on July 7th, and in Kval Sound on July 24th; not very common. *Acartia longiremis* is recorded by Sars from north of the New Siberian Islands\*.

\* Norwegian North Polar Exped. 1893-96, Crustacea, p. 106 (1900).

## Fam. Cyclopidae.

\* *Oithona helgolandica*, Claus.

The species we record under this name appears to be identical with that from the British seas, which, according to Sars, has been wrongly described as *O. spinifrons* of Boeck, but which is equal to the *O. pygmaea* of the same author. He shows further that Boeck's *O. pygmaea* is identical with *O. helgolandica*, Claus; and as Claus's name is the older it takes precedence of the other. *O. helgolandica* was observed in several gatherings; it was obtained in two from the vicinity of Kolguev collected in June, and in others collected between Bear and Hope Islands, and in Kval Sound in July.

*Cyclopina gracilis*, Claus.

This small but distinct species was obtained in some dredged material from two places, viz. from moderately shallow water near Kolguev Island in June, and in July in material from 100 to 110 fathoms to the east of Hope Island. Only one or two specimens were observed. This species has also been taken by Mr. Bruce near Cape Flora, Franz-Josef Land †.

*Thorellia brunnea*, Boeck.

*Thorellia* was obtained sparingly amongst some material dredged in 20 fathoms between the Island of Kolguev and the south-west end of Novaya Zemlya on the 16th of June. It has also been recorded from near Elmwood, Franz-Josef Land †. The species is also frequent in the British seas.

*Cyclops* (?) *bisetosus*, Rehberg.

The small *Cyclops* which we ascribe to *C. bisetosus* agrees with that species in having comparatively short 17-jointed antennules, and in the end joints of the fifth pair of thoracic feet being narrow-cylindrical, and having the short terminal bristle setiform rather than minute and tooth-like as in *C. vernalis*. The receptaculum seminis also closely resembles that of *C. bisetosus*. But, on the other hand, our specimens have the lateral extremities of the fifth segment

\* Sars, *op. cit.* p. 119, removes *Oithona* from the fam. Cyclopidae to a new family—the Oithonidae.

† T. Scott, "On the Crustacea of Franz-Josef Land," Journ. Linn. Soc. (Zool.) vol. xxvii. no. 174 (July 1899), p. 93.

‡ T. Scott, *op. cit.* p. 93.



of the cephalothorax narrowly produced and sinuate, so as to be somewhat similar in this respect to *C. vernalis*, and but for this we should have had no hesitation in ascribing our specimens to Rehberg's species. These specimens were collected by Mr. Bruce in a freshwater pond near Kostyn Point, Novaya Zemlya, on June 18th, 1898.

Fam. Harpacticidæ.

*Ectinosoma Sarsi*, Boeck.

This species was dredged on the east side of Kolguev, and also from 27 fathoms in the vicinity of Hope Island; only a few specimens were observed.

*Ectinosoma curticorne*, Boeck.

This also occurred very sparingly in the sample from the east side of Kolguev, which was the only gathering where *Ectinosoma curticorne* was observed.

*Ectinosoma melaniceps*, Boeck.

One or two specimens of *Ectinosoma melaniceps* were obtained in some material dredged in 100 fathoms to the east of Hope Island on July 13th.

*Ectinosoma atlanticum* (Brady & Robertson).

This small species was of general occurrence in the tow-net gatherings collected by Mr. Bruce in the summer of 1898, and appeared to be more or less generally distributed over the Barents Sea from Kolguev to Spitzbergen; in none of the gatherings, however, was it very plentiful.

*Zosima typica*, Boeck.

This species occurred very sparingly in some material dredged in 100 fathoms to the east of Hope Island on July 13th.

*Robertsonia tenuis* (Brady & Robertson).

This was obtained in the same gathering with *Zosima typica*, but appeared to be rare. *Robertsonia tenuis* is one of the species recorded by T. Scott from Franz-Josef Land, and it also appears to be widely distributed in the British seas.

*Aymone sphaerica*, Claus.

One or two specimens of an *Aymone* that appear to belong to this species were dredged in 20 fathoms between Kolguev and the neighbouring shores of Novaya Zemlya on the 16th of June.

*Ameira longipes*, Boeck.

This species occurred very sparingly in some material dredged in 20 fathoms off Kolguev on June 11th, and in 27 fathoms in the vicinity of Hope Island on July 6th.

*Jonesiella spinulosa* (Brady & Robertson).

A few specimens of *Jonesiella spinulosa* were found in a shore-gathering from the east side of Kolguev Island, collected on June 12th, and in some material dredged in 60 fathoms in lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$ , on July 20th.

*Jonesiella Brucei*\*, T. & A. Scott (sp. n.). (Pl. III.)

*Description of the Species.*—The length of the female represented by the drawing (fig. 1) is .98 mm. (nearly  $\frac{1}{5}$  of an inch). The body is moderately stout and terminates anteriorly in a prominent rostrum; the abdomen is comparatively short, while the caudal furca are slender and about as long as the entire length of the last three abdominal segments.

The antennules are short and six-jointed; the first two and the last joints are of nearly equal length and longer than any of the other three, the penultimate joint is very small, while the third and fourth are together about equal in length to the second joint. The formula shows approximately the proportional lengths of the different joints:—

Number of the joints	.....	1	2	3	4	5	6
Proportional lengths	.....	28	. 23	. 12	. 8	. 6	. 23

The antennules, as shown by the drawing (fig. 2), are provided with numerous moderately long setæ. The antennæ (fig. 3) are somewhat like those of *Jonesiella hyæne*, I. C. Thompson, in their general structure, the secondary branches being also three-jointed, as in that species.

The mandibles (fig. 4) are moderately stout and furnished with a well-developed two-branched palp, but the branches appear to be uniarticulate. The maxillæ (fig. 5) are somewhat like those of *Jonesiella fusiformis*, G. S. Brady; the

\* Named after Mr. W. S. Bruce, to whom we are indebted for the privilege of describing the species.

masticatory lobe is stout and armed with several setiferous spines, and the palp has a somewhat complex lobate structure; the basal joint of the palp, which is articulated near the middle of the masticatory lobe and extends forward alongside of it, is moderately stout; the secondary joint is scarcely so broad as the terminal part of the basal joint, and is provided with two small supplementary branches.

The maxillipeds resemble those of *Jonesiella spinulosa* (Brady and Robertson); figure 6 represents one of the second maxillipeds.

The swimming-feet are also somewhat like those of the species just referred to, except that the first pair do not appear to be so strongly setiferous. The two-jointed inner branches of the first pair (fig. 7) are about as long as the three-jointed outer branches. In the next three pairs, which are all somewhat similar in structure, the inner as well as the outer branches are three-jointed (fig. 8). In the fifth pair the secondary joints appear to be more or less coalescent with the basal joints as shown in the drawing (fig. 9), and thus assume a bilobed appearance; the inner lobe bears four elongated setæ, two of which spring from the distal half of the interior margin and two from the apex, while the outer lobe carries one long and one short apical seta, as well as a moderately stout seta on the exterior margin.

No males of this species have been observed.

*Habitat.* Deep water (100 to 110 fathoms) to the east of Hope Island, very rare. Only one or two specimens of this distinct species have been observed by us.

*Delavalia arctica*, T. Scott.

1899. *Delavalia arctica*, T. Scott, "Crust. from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxvii. p. 98, pl. v. fig. 14, pl. vi. figs. 7-11.

One or two specimens of this recently described *Delavalia* were obtained in a shore-gathering from the east side of Kolguev Island, collected on June 12th, 1898.

*Canthocamptus staphylinus* (Jurine).

This widely distributed species was moderately common in a gathering from a large inland pond near Kostyn Point, Novaya Zemlya, collected on June 18th.

*Canthocamptus palustris*, G. S. Brady.

This species, which was very rare in the gathering examined, was collected in a pond about one mile inland, on an

extensive sandy shore on the east side of Kolguev Island, on June 12th. The water of the pond appeared to be brackish.

*Mesochra Lilljeborgi*, Boeck.

A few specimens of *Mesochra Lilljeborgi* occurred in the same gathering with *Delavalia arctica*, from the east side of Kolguev Island.

*Laophonte horrida*, Norman.

This curious species was observed in gatherings from the following localities :—West side of Bear Island, collected on July 3rd ; five miles west of Hope Island in 17 fathoms, collected on July 5th or 6th ; and near the same locality as the last, but in 27 fathoms, collected July 6th. The species was rare in all the three samples examined.

*Laophonte curticauda*, Boeck.

This species was very rare ; it occurred in a gathering from 20 fathoms off the north end of Kolguev, collected June 11th ; in one from 12 fathoms off the south-west end of Novaya Zemlya, collected June 17th ; and in a gathering from 60 fathoms, collected on July 20th in lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$

*Laophonte longicauda*, Boeck.

*L. longicauda* occurred in a gathering from 100 fathoms collected on July 13th in lat.  $76^{\circ} 24' N.$ , long.  $33^{\circ} 43' E.$  ; the species was apparently very rare.

*Laophonte perplexa*, T. Scott.

1899. *Laophonte perplexa*, T. Scott, *op. cit.* p. 103, pl. vii. figs. 1-7.

A few specimens of this species were dredged in 27 fathoms west of Hope Island on July 6th. The species was described in 1899 from specimens collected by Mr. Bruce off Cape Flora, Franz-Josef Land, and is one that requires careful examination.

*Laophonte serrata* (Claus).

This fine species was obtained in some dredged material from the vicinity of Bear Island collected on July 3rd, but was apparently very rare.



*Cletodes longicaudata*, Brady & Robertson.

One or two specimens apparently belonging to *Cletodes longicaudata* occurred in a sample of bottom-material from 100 fathoms collected on July 13th in lat.  $76^{\circ} 24' N.$ , long.  $33^{\circ} 43' E.$

*Cletodes tenuipes*, T. Scott.

1897. *Cletodes tenuipes*, T. Scott, Fifteenth Ann. Rept. Fishery Board for Scotland, pt. iii. p. 170, pl. i. figs. 19-27.

The sample in which *Cletodes tenuipes* was obtained was collected in 60 fathoms in lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$ , on July 20th, and was the only gathering in which the species was observed.

*Cletodes linearis* (Claus).

This fine species was observed, though very sparingly, in a sample of bottom-material collected in 20 fathoms off Kostyn Point, Novaya Zemlya, and in another from 100 fathoms collected on July 13th in lat.  $76^{\circ} 24' N.$ , long.  $33^{\circ} 43' E.$

*Cletodes similis*, T. Scott.

1895. *Cletodes similis*, T. Scott, Thirteenth Ann. Rept. Fishery Board for Scotland, pt. iii. p. 168, pl. iii. figs. 22-26, pl. iv. figs. 1-3.

One or two specimens of this species occurred in a gathering from 60 fathoms collected on July 20th in lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$

*Cletodes Brucei*, T. & A. Scott (sp. n.). (Pl. V. figs. 9-11.)

A single specimen of a slender *Cletodes* occurred in a sample of bottom-material collected on the 13th of July, at the depth of 100 fathoms east of Hope Island, in lat.  $76^{\circ} 24' N.$ , long.  $33^{\circ} 43' E.$ ; and as it belongs to an apparently undescribed species we submit the following description, which, owing to the want of specimens for dissection, is somewhat incomplete.

The specimen, which appeared to be a female, measured about  $\cdot 6$  mm. ( $\frac{1}{40}$  of an inch) in length. The animal, seen from above, is of a narrow cylindrical form, and each segment is furnished with one or two pairs of minute lateral bristles (fig. 9); the rostrum is very short, and the forehead somewhat truncate; the caudal furca are moderately elongated, slender, and wide apart, and about equal in length to the last abdominal segment. The antennules are very short, but we were unable to make out the structure of these and of the mouth-appendages.

The thoracic feet are very slender. The outer branches are moderately elongated and three-jointed, while the inner branches, which in the second, third, and fourth pairs are considerably shorter than the outer ones, are two-jointed; figure 10 on Plate V. represents the fourth pair. The preparation of the first pair was too imperfect for drawing. In the fifth pair (fig. 11) the basal joint is scarcely developed, but the secondary joint (or branch) is extremely elongated and slender, and bears a few apical setæ, and one on the distal half of the outer margin; a slender process forming the base of a small seta extends from the outer aspect of the basal joint.

The peculiar form of this Copepod, together with the slender thoracic feet, and especially the extremely long and slender secondary branches of the fifth pair, distinguish it from any other species of *Cletodes* known to us.

*Cletodes abyssicola*, T. & A. Scott (sp. n.). (Pl. V. figs. 1-8.)

*Description of the Female*.—Length from the forehead to the end of the caudal furca about .9 mm. ( $\frac{1}{23}$  of an inch). Viewed from above the body is nearly cylindrical, and the posterior margins of the various segments are fringed with minute bristles; the cephalic segment is armed with a strong and backward-curved median dorsal spine, and a small spine also arises from the median dorsal aspect of the last abdominal segment, as shown in the drawing (fig. 1; figs. *a* and *b* show the anterior and posterior dorsal spine as seen in profile). The caudal furca are long and slender, being nearly equal to half the entire length of the body.

The antennules are moderately elongated and seven-jointed; the second and third joints are subequal, and are together about as long as the entire length of the remaining four joints, which are also subequal. The proportional lengths of the joints are shown approximately by the formula:—

Number of the joints. . . . .	1	2	3	4	5	6	7
Lengths of the joints. . . . .	12	. 21	. 28	. 11	. 13	. 11	. 11

The antennules are sparingly setiferous, and the third joint bears a moderately long aesthetasc (fig. 2).

The secondary branches of the antennæ are almost obsolete, being each reduced to a single seta, which springs from the end of the second joint (fig. 3).

The mandibles are moderately stout and provided with a comparatively broad masticatory part; the palp is small and composed of two joints, the second of which is very minute, both joints bear a few terminal setæ (fig. 4).

The posterior foot-jaws are small but moderately robust; a stout seta springs from the inner distal angle of the first joint, while the end joint bears a moderately stout terminal claw (fig. 5).

In the first pair of thoracic feet (fig. 6) the second and third joints of the outer branches are together about equal in length to the first joint; the inner branches are uniarticulate and more or less rudimentary. The second, third, and fourth pairs are somewhat similar to each other in structure; the outer branches, which are all three-jointed, are long and slender, the first and third joints are elongated and subequal, but the middle joint is short; the inner branches are nearly obsolete, being each composed of a single minute joint bearing two small terminal setæ, as shown by figure 7, which represents the fourth pair. In the fifth pair the secondary branches are elongated and very slender, and provided with three terminal setæ of unequal length, the innermost being the smallest, a small seta also springs from near the middle of the outer margin, as shown in the drawing; the basal joint, which forms a narrow border along the edge of the thoracic segment, bears a small seta near its inner extremity, while it terminates exteriorly in forming the base of a long slender seta (fig. 8).

*Habitat*.—Lat.  $76^{\circ} 17'$  N., long.  $21^{\circ} 36'$  E., 60 fathoms; rare. Only a single specimen of this very distinct form was observed. It combines in some measure the general characters of *Cletodes monensis*, I. C. Thompson, and *C. longicaudata*, Brady & Robertson, having the dorsal hooks of the one and the long caudal furca of the other.

*Nannopus palustris*, Brady.

One or two specimens of this species occurred in a gathering from the east side of Kolguev Island collected on June 12th; this is a littoral as well as a brackish-water species.

*Platychelipus littoralis*, Brady.

This species, which bears a general resemblance to *Nannopus* and is frequently found in the British seas associated with that form, was obtained sparingly in the same gathering with it from the east side of Kolguev Island.

*Dactylopus tenuiremis*, Brady & Robertson.

The gathering in which this species was observed was collected on the 13th of July to the east of Hope Island at a depth of 100 to 110 fathoms; the species appeared to be very rare.

*Dactylopus tisboides*, Claus.

This common and generally distributed species occurred in a sample collected on the west side of Bear Island on July 3rd, but, as in the case of most of the others, only a few specimens were observed.

*Dactylopus longirostris*, Claus.

*Dactylopus longirostris* was obtained in the same gathering with *D. tenuiremis*, collected to the east of Hope Island on July 13th.

*Dactylopus flavus*, Claus.

The gathering in which *D. flavus* occurred was collected in 60 fathoms in lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$ , on July 20th.

*Dactylopus Brucei*, T. & A. Scott (sp. n.). (Pl. IV. figs. 1-6.)

One or two specimens of this *Dactylopus* were obtained in a sample of bottom-material from 20 fathoms somewhere off Kostyn Point, Novaya Zemlya, or between there and Kolguev Island, collected on June 16th, 1898. As the species appears to be "new," we submit the following description of the female (no male was observed):—

Body moderately slender; rostrum short but distinct; caudal furca very short, each furcal joint is furnished with a stout and moderately long, lance-shaped, terminal spine, in addition to a few minute hairs (fig. 1); the length of the specimen figured is about .77 mm. ( $\frac{1}{32}$  of an inch).

The antennules are short and eight-jointed; the first four joints are moderately large and subequal, but the last four are smaller (fig. 2); the proportional lengths of the different joints are shown approximately by the formula:—

Number of the joints . . . . .	1	2	3	4	5	6	7	8
Lengths of the joints . . . . .	11	10	12	12	5	6	5	7

The antennæ and most of the mouth-appendages are somewhat similar to the same appendages in *Dactylopus Strömii* (Baird), but the second maxillipeds are rather more slender and armed with long terminal claws (fig. 3).

The first pair of swimming-feet are moderately stout (fig. 4); the proximal joint of the inner branches is robust and equal to rather more than one and a half times the entire length of the other two, which are small and subequal; a moderately long plumose seta springs from near the end of the inner margin of the first joint, while the third joint is armed at the



apex with a slightly clawed spine of moderate length and an elongated seta; the outer branches are scarcely equal in length to the inner ones; a stout spine springs from the outer distal angles of the first and second joints, while the third carries two similar spines and two elongated setæ at its distal end. The second, third, and fourth pairs are somewhat similar to those of *Dactylopus Strömi*, but are rather more slender; figure 5 represents the fourth pair. The fifth pair in the present species has also a resemblance to the same pair in *Dactylopus Strömi*, but slight differences are observable, especially in the shape of the secondary joints, which are oval in form and about twice as long as broad (fig. 6); in these joints an elongate slender seta springs from near the middle of the interior margin and another from near its distal end, in addition to three long apical setæ; the produced part of the basal joint is also furnished with five setæ, which are arranged round the distal half of the outer margin and apex, as shown in the figure.

The stout lance-shaped spine, with which each of the caudal furca is armed, forms a character by which the species can be readily identified. The species is named in compliment to Mr. Bruce, who has done so much in the interests of Arctic and Antarctic research.

*Thalestris forficulus*, Claus.

This species was observed very sparingly in samples of bottom-material from 20 fathoms collected between Kolguev and Novaya Zemlya on June 11th; from the west side of Bear Island, collected on July 3rd; and from 27 fathoms off Hope Island, collected on the 6th of the same month.

*Thalestris Krohnii* (Kröyer).

Syn. *Thalestris serrulatus*, Brady, Monograph Brit. Copepoda, vol. ii. p. 133, pl. lix. figs. 2-11.

This fine species, which sometimes makes its appearance in the British seas, was captured by tow-net between South Cape, Spitzbergen, and Bear Island on July 22nd, and in Kval Sound on the 24th of the same month; both males and females were obtained.

*Thalestris helgolandica*, Claus.

This species occurred in a gathering from Kval Sound collected on July 24th, but only a single specimen was observed.



*Harpacticus chelifer* (Müller).

One or two specimens of this Copepod were noticed in a tow-net gathering collected in Kval Sound on July 24th; while several of the variety *arcticus*, Poppe \*, were obtained amongst bottom-material chiefly collected on the west side of Bear Island on July 3rd, near Hope Island on July 7th, and in lat.  $76^{\circ} 33' N.$ , long.  $33^{\circ} 43' E.$ , on July 13th.

*Zaus spinatus*, Goodsir.

Specimens of *Zaus spinatus* were not uncommon in one or two bottom-gatherings collected near Kolguev Island and between there and Novaya Zemlya in June.

*Zaus Goodsiri*, Brady.

A specimen of this fine species, measuring 1.4 mm. ( $\frac{1}{18}$  of an inch), was obtained in a sample of bottom-material from 100 fathoms collected in lat.  $76^{\circ} 24' N.$ , long.  $33^{\circ} 43' E.$ , on July 13th.

*Zaus Aurelii*, Poppe. (Pl. IV. figs. 7-12.)

1884. *Zaus Aurelii*, Poppe, Ueber die von den Herren Dr. Arthur u. Aurel Krause im nördl. Stillen Ocean u. Behrings-Meer gesammelten freilebenden Copepoden (Arch. f. Naturgesch. 50 Jahrg. i. Bd.), p. 286, Taf. xx. figs. 7-9, Taf. xxi. figs. 5-15.

Specimens of a Copepod which appear to us to belong to Poppe's *Zaus Aurelii* were obtained in a bottom-gathering from 20 fathoms between Kolguev Island and Novaya Zemlya collected on June 16th. In the adult female, of which we give a drawing (see Pl. IV. fig. 7) the cephalic and thoracic segments are scarcely so broad as they are shown to be in Dr. S. A. Poppe's figure, but a slight amount of extra pressure on the cover-glass under which the specimen was placed might be sufficient to account for this. The Kolguev specimens appear also to be rather smaller than those from the North Pacific and Behring's Sea; but, as will be seen by

\* Mr. T. Scott, in his "Report on Franz-Josef Land Crustacea" (Journ. Linn. Soc., Zool. vol. xxvii.), describes and figures a variety of *H. chelifer* under the name of var. *arcticus*. At this time he was unaware of the fact that Dr. S. A. Poppe had in 1884 published a paper on some North Pacific and Behring's Sea Copepods. In this paper Dr. Poppe has also described a var. *arcticus* of the same species, and it is interesting to note that the variety described by T. Scott is practically identical with that described by Dr. Poppe. Dr. Poppe's varietal name *hals*, of course, clear priority over Mr. Scott's, and must therefore be adopted.

comparing our figures with those of Dr. Poppe, the structural details are practically the same.

*Idya furcata* (Baird).

This species was observed in a shore-gathering from the east side of Kolguev Island, collected on June 12th.

Fam. *Lichomolgidae*.

*Lichomolagus hirsutipes*, T. Scott.

1893. *Lichomolagus hirsutipes*, T. Scott, Eleventh Ann. Rept. Fishery Board for Scotland, pt. iii. p. 206, pl. iv. figs. 1-12.

This, like the *Idya furcata* recorded above, was obtained in the shore-gathering from the east side of Kolguev Island, but was apparently very rare.

Fam. *Asterocheridae*.

*Asterocheres simulans* (T. Scott).

1898. ? *Ascomyzon simulans*, T. Scott, Sixteenth Ann. Rept. Fishery Board for Scotland, pt. iii. p. 270, pl. xiii. figs. 1-9, pl. xiv. fig. 22.

One or two specimens of this *Asterocheres* were found in a sample of bottom-material from 100 fathoms collected east of Hope Island on July 13th.

*Asterocheres Boeckii* (Brady).

A few specimens of *A. Boeckii* (Brady) occurred in a gathering collected in the vicinity of Hope Island in 27 fathoms on July 6th.

*Dermatomyzon nigripes* (Brady & Robertson).

This fine species was taken in 60 fathoms, along with *Cletodes abyssalis* and others, in lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$ , on July 20th.

*Parartotrogus Richardi*, T. & A. Scott,  
var. *arctica*, var. nov. (Pl. VI.)

1893. *Parartotrogus Richardi*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. xi. p. 210, pl. vii. figs. 1-11.

One or two specimens apparently belonging to this species were found in the same gathering with *Asterocheres simulans* from 100 fathoms to the east of Hope Island, and in another

collected off Kolguev in June. As one or two slight differences have been observed between these specimens and those obtained in the Firth of Forth, we submit the following remarks on these differences as well as on the otherwise close similarity of the Arctic and Scottish specimens.

Figure 1 (Plate VI.) is a drawing of one of the Arctic female specimens; this specimen measures  $\cdot 78$  mm. ( $\frac{1}{30}$  of an inch), and is thus proportionally larger than those from the Firth of Forth.

The antennules and antennæ (figs. 2 & 3), the mouth-appendages (figs. 4 to 7), and the first, second, and fifth pairs of thoracic feet (figs. 8, 9, & 12) are similar to the same appendages in the Scottish specimens. The third pair of thoracic feet have the inner branches three-jointed and armed with an elongated dagger-like terminal spine in addition to several plumose setæ; but in the specimens from the Firth of Forth the inner branches of the same pair are only two-jointed, they are not provided with terminal spines but carry instead two slender apical setæ; it may be observed, however, that though the inner branches of the Forth specimens are only two-jointed, the end joint is long and may therefore consist of two coalesced joints, which, under the influence of the altered conditions to which the Arctic specimens may be exposed, have become distinct; these altered conditions may also explain the difference in the armature of the branches.

But in addition to this difference in the third pair of thoracic feet between the Arctic and Scottish specimens, there is the presence, in the Arctic specimens, of what appears to be a very small and rudimentary fourth pair of thoracic feet, each consisting of a small lamelliform basal joint, and a minute secondary one bearing two dagger-like apical spines (fig. 11). In the specimens from the Firth of Forth, on the other hand, the presence of a fourth pair has not been observed\*. This rudimentary fourth pair in these Arctic specimens is, perhaps, a more important difference than the other; but as the Arctic and Scottish specimens appear to agree so closely in every other respect, we can meantime regard this northern form only as a variety of *Parartotrogus Richardi*.

\* In the original description of *Parartotrogus Richardi* in the Ann. & Mag. Nat. Hist. (6) vol. xi. p. 210, the authors were somewhat uncertain whether it was the second or the fourth pair that was wanting; but Dr. Giesbrecht of Naples has shown that it is the fourth pair, so that the "2<sup>d</sup> third and fourth pairs" in the original description should be the "second and third pairs."

The male is very like the female but is rather smaller; the antennules (fig. 14) appear to consist of eleven instead of nine joints, and the end joints are hinged and adapted for grasping; the abdomen (fig. 15) is composed of five instead of four segments, but otherwise there is little apparent difference between the two sexes.

#### OSTRACODA.

The following Ostracoda have been observed in some of the gatherings :—

*Candona Harmsworthi*, T. Scott.—A number of adult and apparently immature specimens of this *Candona* occurred in one or two gatherings from ponds of slightly brackish water at the south end of Novaya Zemlya—the first near Kostyn Point on June 18th, and the other near Cape Chetney on June 21st. This is one of the species described by T. Scott in his “Report on Franz-Josef Land Crustacea” \*.

*Cythere concinna*, Jones.—A few specimens in a gathering from 60 fathoms, collected July 20 in lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$

*Cythere costata*, G. S. Brady.—In the same gathering with the last; rare. In this gathering the following additional species were also observed :—

*Cythere emarginata* (G. O. Sars).—Rare.

*Cythere globulifera*, G. S. Brady.—Rare.

*Cythere tuberculata* (G. O. Sars).—Rare.

*Cythere dunelmensis* (Norman).—Rare.

*Limnocythere inopinata* (Baird).

A single specimen of *Limnocythere inopinata* occurred in the gathering from Cape Chetney, Novaya Zemlya; it somewhat resembles the form described by Dr. Dahl as *Limnocythere incisa* †, but the shell is rather more compressed at the posterior end.

\* Journ. Linn. Soc., Zool. vol. xxvii. (no. 174) p. 83, pl. iii. figs. 16, 17 (1899).

† “Die Cytheriden der westlichen Ostsee,” Zool. Jahrb. Bd. iii. (1888) p. 20, pl. ii. figs. 49–58.



*Cytheridea papillosa*, Bosquet.—50 fathoms, lat.  $76^{\circ} 17' N.$ , long.  $21^{\circ} 36' E.$ , collected July 20th; rare.

*Cytheridea punctillata*, G. S. Brady.—In the same gathering with the last; rare.

*Xestoleberis depressa*, G. O. Sars.—Collected in the vicinity of Hope Island in 27 fathoms, July 6th, 1898; rare.  
The next three species are from the same gathering.

*Xestoleberis aurantia* (Baird).—Rare.

*Sclerochilus contortus* (Norman).—Rare.

*Paradoxostoma variabile* (Baird).—Rare.

*Philomedes brenda* (Baird).—This species was captured in the surface tow-net to the north of Bear Island on July 5th; it also occurred in other two gatherings collected on the 12th and 13th of the same month.

#### CLADOCERA.

A few ephippia, apparently of some species of *Daphnia*, were the only representatives of the Cladocera observed in this collection; they occurred in the gatherings from the ponds at Kostyn Point and Cape Chetney, Novaya Zemlya.

#### EXPLANATION OF THE PLATES.

##### PLATE III.

##### *Jonesiella Brucei*, sp. n.

Fig. 1. Female, seen from left side,  $\times 80$ . 2. One of the antennules,  $\times 190$ . 3. One of the antennæ,  $\times 190$ . 4. Mandible and palp,  $\times 190$ . 5. Maxilla,  $\times 250$ . 6. Second maxilliped,  $\times 250$ . 7. Foot of first pair,  $\times 127$ . 8. Foot of fourth pair,  $\times 127$ . 9. Fifth foot,  $\times 250$ . 10. Last abdominal segment and caudal furca,  $\times 126$ .

##### PLATE IV.

##### *Dactylopus Brucei*, sp. n.

Fig. 1. Female, seen from the left side,  $\times 106$ . 2. One of the antennules,  $\times 380$ . 3. One of the second maxillipeds,  $\times 250$ . 4. Foot of first pair,  $\times 250$ . 5. Foot of fourth pair,  $\times 250$ . 6. Fifth foot,  $\times 250$ .

##### *Zaus Aurelii*, Poppe.

Fig. 7. Female, dorsal view,  $\times 80$ . 8. One of the antennules,  $\times 254$ . 9. One of the second maxillipeds,  $\times 254$ . 10. Foot of first pair,  $\times 190$ . 11. Fifth foot,  $\times 170$ . 12. Abdomen and caudal furca,  $\times 95$ .

## PLATE V.

*Cletodes abyssicola*, sp. n.

- Fig. 1.* Female, dorsal view (*a* and *b*, dorsal spines seen in profile),  $\times 100$ .  
 2. One of the antennules,  $\times 250$ . 3. One of the antennæ,  $\times 500$ . 4. Mandible and palp,  $\times 760$ . 5. Second maxilliped,  $\times 760$ . 6. Foot of first pair,  $\times 500$ . 7. Foot of fourth pair,  $\times 340$ . 8. Fifth foot,  $\times 250$ .

*Cletodes Brucei*, sp. n.

- Fig. 9.* Female, dorsal view,  $\times 106$ . 10. Foot of fourth pair,  $\times 250$ .  
 11. Fifth foot,  $\times 380$ .

## PLATE VI.

*Parartotrogus Richardi*, T. & A. Scott, var. *arctica*.

- Fig. 1.* Female, dorsal view,  $\times 80$ . 2. One of the antennules,  $\times 190$ .  
 3. One of the antennæ,  $\times 190$ . 4. Mandible,  $\times 380$ .  
 5. Maxilla,  $\times 253$ . 6. First maxilliped,  $\times 127$ . 7. Second maxilliped,  $\times 127$ . 8. Foot of first pair,  $\times 170$ . 9. Foot of second pair,  $\times 123$ . 10. Foot of third pair,  $\times 123$ . 11. Foot of fourth pair,  $\times 500$ . 12. Fifth foot,  $\times 380$ . 13. Abdomen and caudal furca,  $\times 84$ . 14. One of the antennules, male,  $\times 190$ . 15. Abdomen and caudal furca, male,  $\times 84$ .

XLVI.—*Notes on the Genera Tanaecia and Nora, with Descriptions of new Species.* By ARTHUR G. BUTLER, Ph.D. &c.

I ACCEPT the genus *Tanaecia* as restricted by Dr. F. Moore in his 'Lepidoptera Indica,' with the addition of certain species placed by him in the genus *Nora*; I also omit *Adolias indras* of Vollenhoven (which is undoubtedly the female of *Nora ramada*).

With regard to Herr Frühstorffer's list (Berl. ent. Zeit. xlv. pp. 127–129), it appears to me that his attempt to group the species is much marred by his failure to appreciate the characters afforded by pattern. In his action with regard to *T. violaria* he is evidently guided by colour apart from pattern, this species being without question very closely related to *T. vikrama*, but having little affinity to *T. apsarasa*; the same is true of *T. Vordermanni*. His supposition that *T. orphne* may be the male of *T. valmiki*s and *T. aruna* an aberration of *T. pelea* again shows that he has not appreciated the entirely different pattern of the groups of *Tanaecia*; as a matter of fact, I believe *T. aruna* will prove to be Vollenhoven's *T. varuna*, or, at best, a very closely related local form thereof. Of *T. orphne* we have both sexes.

With regard to *T. pelea*, two males so named in the Kaden Collection came into the Museum through the liberality of F. D. Godman, Esq., F.R.S., and these are barely separable from males of *T. palguna*. Considering how much misunderstanding has existed in the minds of lepidopterists respecting *T. pulasara* and other females of this genus, I think it better to accept Dr. Kaden's identification.

Herr Frühstorffer's suggestion that the character of the palpus, upon which the genus *Tanaecia* was based, being variable, the similarity of the sexes (as opposed to that of other Euthaliinæ) should be considered the most important character for distinguishing *Tanaecia*, seems to me to be hasty, and is certainly not borne out by facts. The third joint of the palpus in *Tanaecia* is always spine-like, and this character is only found elsewhere in those genera which have recently been separated from *Tanaecia*, not in other groups of Euthaliinæ. It is true that some species, or the males of some species, show a greatly abbreviated spine-like joint, whereas others show a long needle-like joint; but this is a specific distinction, and in no way affects the value of the character as a guide to the genus. On the other hand, if similarity of sexes were to be accepted as an indication of a *Tanaecia*, *Nora laverna* (*lavernalis*, De Nicév.) would have to be placed in *Tanaecia*; whereas *T. orphne*, the sexes of which are not remarkably similar, would have to be forcibly expelled from the genus. As a matter of fact, the sexes of *Tanaecia* are not by any means invariably alike; the males are frequently shorter in wing than the females, and the under-surface markings differ considerably.

Now as regards *Nora laverna*, to which Mr. De Nicéville has applied the new name of *lavernalis*, I was surprised to find the following remarkable observation:—"As Mr. Butler has elected to consider the female of his *E. laverna* from Penang and Malacca as the type of his species (both sexes of which are described and figured by Mr. Distant in his '*Rhopalocera Malayana*'), I propose to name the male figured by Mr. Butler *Euthalia lavernalis*, as it is at present unnamed."

Even if I had elected to ignore my description of the male (which, as a matter of fact, has priority, being first described) I could not do so unless it were proved to be synonymous with something previously described; this, however, happens to be the case with my supposed female from Penang, which is undoubtedly the *N. somadeva* of Felder, so that it becomes still more impossible to ignore the only specimen to which I attached a type label. The male figured by Mr. Distant, which we have from Malacca, appears to me to be a slight

local form of *Nora bipunctata* ♂, whereas analogy goes to prove that *N. cordelia* of Frühstorffer is the true male of *N. somadeva*; indeed, the bronze variety of *N. cordelia* stood as *N. somadeva* in the Crowley Collection.

The following are the described species of *Tanaecia*:—

*Pelea* group.

1. *T. pelea*, Fabr. "India" (*Fabr.*), ♂ ♂. B. M.
- 1a. *T. palguna*, Moore. Java, ♂ ♂ ♀ ♀. B. M.
2. *T. stygiana*, Frühst. Lomboek (Coll. Crowley). B. M.
3. *T. pulasara*, Moore. Penang, Singapore, Malacca, Perak. B. M.

*T. supercilia* is a synonym of *T. pulasara*, and *T. Robertsi* a variety paler in colour and with only the commencement of the lunated streak through the white discal belt on the primaries.

4. *T. heliophila*, Frühst. Nias (Coll. Crowley). B. M.

*Vikrama* group.

5. *T. Vordermanni*, Snellen. Billiton. B. M.

Differs from *T. vikrama* in the whiter discal belt across the primaries.

6. *T. vikrama*, Felder. Sumatra. B. M.
7. *T. violaria*, Butler. Sumatra. B. M.

Described from Singapore.

*Apsarasa* group.

8. *T. munda*, Frühst. Borneo (*Low*). B. M.

Described from examples obtained on Kina Balu. We received nine examples (exhibiting a good deal of variation as regards the suffused or white spots beyond the cell of primaries and the amount of violet suffusion of the external area on both surfaces of the secondaries) from the Godman Collection.

9. *T. apsarasa*, Vollenh. Baram, Sarawak, &c. B. M.
10. *T. martigena*, Weymer. Deli, Sumatra (Coll. Crowley), Borneo. B. M.

*Nicévillei* group.

11. *T. phintia*, Weymer. Sumatra.

12. *T. clathrata*, Vollenh. Sarawak, ♂. B. M.

This insect has a beautiful violaceous shot on the under surface of the wings.

13. *T. cœrulescens*, Gr.-Smith. Kina Balu.

14. *T. Nicévillei*, Distant. Lavas, Borneo (Coll. Crowley), Perak. B. M.

*Valmikiis* group.

15. *T. orphne*, Butler. Sarawak, ♂ ♂ ♀. B. M.

16. *T. consanguinea*, Distant. Sarawak, ♂ ♂ ♀ ♀. B. M.

This species is nearly related to *T. orphne*, but is paler, with better-defined white markings above and more pearly external area to all the wings below; the males of both have rather a short spine-like third joint to the palpus, whereas the males of *T. lutala*, *valmikiis*, &c. have it long.

17. *T. lutala*, Moore. Borneo (*Low*), Labuan. B. M.

18. *T. valmikiis*, Felder. Borneo (*Low*), Labuan. B. M.

19. *T. varuna*, Vollenh. "Java."

*T. pardalis* is evidently the male of this species.

- 19 a. *T. aruna*, Felder. Perak (Coll. Crowley), Malacca. B. M.

20. *T. sakii*, De Nicév. N.E. Sumatra.

*Palawana* group.

21. *T. palawana*, Staud. Palawan. B. M.

NEW SPECIES.

*Tanaecia ampla*, sp. n.

♀. Allied to *T. palguna*; larger, paler, and broader, the basal area of the primaries sandy brown; the discal white belt much broader, opaline, faintly bluish; divided on the primaries, on median and submedian interspaces, by a brown zigzag line; submarginal whitish bifid spots enlarged and diffused; discal belt of secondaries divided by a zigzag brown line from median vein to submedian, and suffused with brownish above the latter: under surface with the basal area and external area of secondaries suffused with sandy yellow; the markings mostly paler than in *T. palguna*, the hastate discal markings much narrower and more elongated.

Expanse of wings 77 millim.

Philippine Islands (*Pryer*), ex Coll. Godman. B. M.



*Tanaecia producta*, sp. n.

♀. Allied to *T. pulasara*; primaries rather more elongated; discal belt bluish opaline; otherwise similar to var. *Robertsi*, but larger; all the markings below excepting the discal hastate series of primaries indistinct, those on the secondaries indicated in rosy brownish; no markings on the basal area of these wings.

Expanse of wings 77 millim.

Philippine Islands (*Pryer*), ex Coll. Godman. B. M.

*Tanaecia Crowleyi*, sp. n.

♀. Allied to *T. pulasara*, from which it differs above in the pearly-bluish character of the discal belt and of the area just inside the latter (and enclosing the discocellular marking) on the primaries; also in the contracted and interrupted discal series of hastate markings, which in *T. pulasara* form a continuous zigzag line. On the underside the discal hastate markings are small and isolated, the basal area is paler and less ochreous, and the dark markings are wanting or almost so from the discal belt of primaries, whereas in *T. pulasara* there are always one or two towards costa.

Expanse of wings 70 millim.

North Borneo, ex Coll. Crowley. B. M.

*Tanaecia superba*, sp. n.

General pattern of the *T. pelea* group, but colouring of the *T. apsarasa* group; above purplish brown with the usual black markings on the basal area; the male with much the aspect of *Euthalia laverna* ♂, but larger, the discal band better defined with black-bordered white edging internally, with pearly white-edged black hastate markings externally on the primaries: on the secondaries the discal belt is bounded internally by a blue-black dentate undulate line, is white internally excepting below the median vein, where it is somewhat obscured by dusky lunules; externally it is blue, spotted with white towards apex; through the centre of the belt runs a series of seven thick black sagittate markings, and on the basal area from the radial vein to the submedian vein is a lilacine blue suffusion: below, the pattern and colouring are very similar to those of *T. Vordermanni*. The female is not unlike *T. violaria*, excepting that the discal belt of primaries is more restricted and washed with blue towards internal margin and external angle; the belt of the secondaries also is largely pure white internally and blue rather

than lilac externally; the intersecting sagittate black markings are also more central, owing to the blue being extended much further into the outer border: below, the general character is that of *T. violaria*, but the colouring is much deeper and redder.

Expanse of wings, ♂ 61, ♀ 78 millim.

Sumatra, ex Coll. Crowley. B. M.

*Tanaecia Frühstorfferi*, sp. n.

Allied to *T. munda*, the spots beyond cell of primaries in the male small and pearly white, the hastate discal markings more or less outlined in white and blue; the discal belt of the secondaries narrow, pure white, with blue edging above the sagittate markings towards costa, but bright blue, with a white spot filling the hollow of the black bordering lunules, towards the internal area; black hastate dashes, only bounded externally by small blue diffused spots, those nearest apex with white centres: under surface similar to that of *T. Vordermanni*, excepting that the front half of the secondaries is ochraceous, the discal belt is traversed by a vague greyish lunated band, and the sagittate black markings are coarser; in form also this insect more nearly resembles a male *Euthalia* (group *Nora*). The female is lilacine brown above, with the general pattern above of *T. apsarasa* ♀; only the five spots beyond the cell of primaries are larger and suffused with brown, the edges of the hastate black discal markings on these wings more opaline, the discal belt of the secondaries more or less suffused with the ground-colour, the sagittate black markings shorter and followed by white streaks which get smaller towards the internal area: the underside differs from that sex of *T. apsarasa* in its pale burnt-sienna instead of ochreous tint, in the more pearly discal belt with pearly submarginal diffused spots, bounded internally by almost black and small sagittate markings; all the other markings are also much blacker than in *T. apsarasa*, and the abdominal area of the secondaries is pearly bluish-ash in colour.

Expanse of wings 73 millim.

♂ ♀, Borneo (*Low*), ex Coll. Godman. B. M.

This species was probably collected at Labuan; those examples of this genus which we purchased from Mr. Low were stated to be from that locality.

*Tanaecia evanescens*, sp. n.

♂. Allied to *T. munda*; rather larger and with more acute apex to primaries; all the pale markings above restricted,

the black hastate markings across the disk thickened and elongated; enclosed in diffused pale bluish oblong spots on the secondaries in place of the lilac and white belt of *T. munda*; these spots also do not extend inwards to the discal series of black lunules which bound the discal belt of *T. munda*: on the under surface the black markings are arranged much as in *T. munda*, but the external area is suffused with lilacine, and the divisions of this area towards apex of primaries are largely pearly whitish, those of secondaries less so.

Expanse of wings 70 millim.

♂, Labuan (Coll. Bates), ex Coll. Godman. B. M.

*Tanaecia Watsoni*, sp. n.

♂. Nearly allied to *T. apsarasa*; the white markings on the primaries more irrorated with brown; the blackish sagittate markings on all the wings shorter; the whole inner border of the discal belt of secondaries above the lunated line pearl-white: under surface more yellow in tint than in *T. apsarasa*, the basal area of primaries suffused with tawny; the spots enclosed by the double series of lunate markings pearly white on all the wings, as also are the diffused spots behind the sagittate markings.

Expanse of wings, ♂ 61-72, ♀ 80 millim.

♂, N.E. Sumatra (Coll. Watson); ♂ ♀, Sumatra (*Sachs*), ex Coll. Godman. B. M.

The female is much more varied with white than that of *T. apsarasa*.

*Tanaecia albifasciata*, sp. n.

♂. Allied to *T. martigena*; the primaries above with the inner bordering of the hastate markings almost wholly suffused with brown; the discal belt of secondaries not traversed by a grey-blue lunate line; the hastate black markings on the secondaries bounded externally by larger white or lilacine spots. On the under surface the differences are far more marked:—The basal area is more tawny, the markings upon it mostly ferruginous brown instead of black; the discal belt is continuous and pearly white, not interrupted by angular or lunate markings; the submarginal markings are more open (sagittate rather than hastate) and form the inner edges of a series of large pearl-white spots.

Expanse of wings 64 millim.

Borneo (*Low*), ex Coll. Godman. B. M.

It is possible that this may prove to be only a form of *T. Frühstorfferi*, but in outline of wing it is more like

*T. munda*, and it differs from everything else in the broad pearl-white belt on the under surface.

*Tanaecia subochrea*, sp. n.

Form and general pattern above of *T. lutala*, but much darker, with heavier broader black markings; primaries with the five spots in an angular series beyond the cell larger and buffish white; the inner margins of the hastate black markings also white; secondaries with three series of pale markings on external area, buffish white towards costa, brownish buff towards internal area, the central series slenderly lunate, bordering the black hastate markings. Wings below pale ochraceous buff; the markings mostly intensely black; the five white spots of the upper surface on the primaries larger, slightly pearly, as also are the inner borders of the hastate markings; the latter are divided by a row of blackish >-shaped markings not found in *T. lutala*, and on the secondaries a series of black lunate markings runs between the angular postmedian series and the hastate markings.

Expanse of wings 62 millim.

The female is larger than the male, but very similar in pattern, only the hastate markings above and below are shorter and followed by larger buffish spots above and pearl-white spots below: the under surface also is washed with vinous, and the intersecting markings between the postmedian and hastate series are largely obliterated, whilst the postmedian series is followed by a series of pearl-whitish spots.

Sarawak (ex Coll. Moore), ♂♂ ♀. B. M.

This species must stand next to *T. consanguinea*, but it has the form and palpi of *T. lutala*.

*Tanaecia margarita*, sp. n.

Form and pattern above and below of the preceding species, but ground-colour above of *T. lutala*: on the under surface the external area of the primaries in both sexes is pearly whitish, interrupted by the usual markings; in the male the under surface of the secondaries is shining pinkish ashy, with black markings almost as in the preceding species; the female has the basal area of the secondaries similarly coloured to that of the primaries, ochraceous, washed externally with pearly greyish and vinous; the external border is similarly coloured, but interrupted by the usual submarginal series of diffused whitish spots; the disk is pearly ash, whiter towards costa and on the margins of the hastate markings; and most of the markings are of a vinous-brown tint.



Expanse of wings, ♂ 60, ♀ 72 millim.

♂ ♀, Sarawak (*Bartlett*), ex Coll. Moore; ♂, Borneo (*Low*), ex Coll. Godman. B. M.

This is a well-defined species of the *T. lutala* group.

*Tanaecia Dohertyi*, sp. n.

Allied to *T. aruna*; the male more like *T. valmikiis* in form, the costal margin being less arched than in *T. aruna*; the centres of the black basal markings pearly greyish; the black hastate markings more compressed and followed by larger diffused submarginal spots than in *T. aruna*; the costal area and the area beyond the cell of secondaries pale and slightly vinous in the male; the discal belt more white-varied than in *T. aruna*, the hastate markings very small and followed by more elongate, larger, diffused spots: under surface nearly as in *T. valmikiis*, but paler and more pearly, with smaller black markings. The female below is especially pale, with a greenish wash over the basal area and the whole external area bluish opaline.

Expanse of wings, ♂ 62, ♀ 71 millim.

*Var.* ♂.—The upper surface largely whitish; under surface almost wholly opaline white, with the usual black markings.

Expanse of wings 66 millim.

Sula Archipelago (*Pryer*), ex Coll. Godman. B. M.

*The Genus Nora.*

I must confess that I cannot discover a character by which to separate the males of *N. kesava* and *N. rangoonensis*; there are differences as regards the definition of the markings of the under surface in individuals assigned to both forms, and these I should be inclined to attribute to seasonal influence. In like manner, I believe, when these insects are carefully bred it will be discovered that females of the *rangoonensis* type represent the wet phase and those of the *kesava* type the dry phase of the same species. *N. rangoonensis* is not confined to Burma nor *N. kesava* to India; we have both from Silhet, Assam, and Tenasserim.

*List of the Species.*

1. *N. kesava*, Moore. N.E. India, Tibet, and Tenasserim. Type, B. M.
- 1 a. *N. rangoonensis*, Swinhoe. N.E. India, Tenasserim, Burma, Mergui. Type, B. M.



2. *N. bipunctata*, Vollenh. ♂ ♂ ♀ ♀, N.E. Borneo, Labuan. B. M.

Local form? ♂, Malacca (cf. *laverna*, Distant). B. M.

3. *N. obsoleta*, Frühst. Lombock.

4. *N. decorata*, Butler. ♂, Malacca. B. M.

- 4 a. *N. erana*, De Nicév. ♂ ♂ ♀, Sumatra. B. M.

5. *N. laverna*, Butler. ♂ ♂ ♀ ♀, Borneo. Type, B. M.

We have a male labelled as from "Rangoon," but I think this must be an error.

6. *N. ilka*, Frühst. ♂, Borneo. B. M.

7. *N. somadeva*, Felder. Assam, Perak, Malacca, Penang. B. M.

The male is *N. cordelia*, Frühst., the female *N. laverna* ♀ of Distant, Moore, and De Nicéville, erroneously described originally as the female of *N. laverna* from Borneo.

8. *N. ramada*, Moore. Labuan and Sarawak. B. M.

The female is *N. indras* of Vollenhoven.

9. *N. surjas*, Vollenh. Sarawak. B. M.

The male has been confounded with *N. ramada*; it has a more violaceous border above, the under surface much less ochraceous than in *N. ramada*, with pale greyish-white discal belt.

10. *N. salia*, Moore. Java. Type, B. M.

*Var.*—The male with the pale stripe across the disk of primaries whity brown, intersected by the usual zigzag black line; under surface pale yellowish, the stripe across the primaries pearly lavender-whitish; dark markings ill-defined; the female is slightly paler than the typical form. This may prove to be a seasonal modification of the species.

11. *N. cordata*, Weymer. Nias.

Allied to this is a species from the Godman Collection, to which Staudinger gives the name of

12. *N. tanagra*, Staud. Palawan and Borneo. B. M.

## NEW SPECIES.

*Nora indistincta*, sp. n.

♀. General pattern above of *N. laverna* ♀, but much larger; the ground-colour pale greyish earth-brown, with the discal belt sordid whitish; the outer or main fork of the discal belt of primaries ill-defined, broad, only slightly paler than the ground-colour; hastate markings small: under surface paler than in *N. laverna* ♀, the basal area yellowish, partly washed with opaline; discal belt and external area pearly white.

Expanse of wings 80 millim.

♀, Borneo (*Low*). Coll. Druce ex Coll. Godman. B. M.

The male will probably prove to be not unlike that sex of *N. bipunctata*, but larger and more pearly on the external area of the wings on the under surface. It seems to me to stand between *N. bipunctata* and *N. decorata*. It is possible that the above may be the female of an insect which has been regarded as the male of *N. indras*, but which is much darker and redder on the under surface, and decidedly larger than the male of that species might be expected to be; it is also rather a rare insect, whereas both *N. ramada* and *N. indras* are common, and, I think, must be sexes of one species.

XLVII.—*On new Species of Histeridæ.*

By G. LEWIS, F.L.S.

THIS is the twentieth paper treating of the Histeridæ in this Magazine, the latest bearing the date of last March (p. 241). I am glad to be able to notice here another Indian species of the aberrant genus *Niponius*; it is the seventh species known, and I hope some day other allied genera will be discovered whose characters may throw some light on its affinities. For the present, as formerly, I have put the genus in the list near *Cylistix*, because the general form is similar and the mesosternum is not acuminate anteriorly like that of the *Tryponæi*. In 1870 Marseul placed the *Tryponæi* between the genera *Lioderma* and *Apobletes*, but did not give his reasons for doing so. I think that the *Teretrii* and *Tryponæi* form an isolated group like the *Sapriini* (which have the antennal fossettes in the prosternal keel), and that they cannot naturally be located in any lineal arrangement; and being of this opinion I am content to leave them in the catalogue in the position they have hitherto occupied.

*List of Species.*

Phylloma labrosum.	Hister sectator.
—— tuberculatum.	—— Baberii.
Hololepta caudicalis.	—— silvicola.
—— canaliculata.	Paratropus altilis.
Niponius canalicollis.	—— boleti.
Pachycrærus præliaris.	Tylois mirificus.
Baconia jubaris.	Homalopygus geminatus.
—— choaspites.	Teretriosoma unicolorne.
—— Gounellei.	—— Stebbingii.
Omalodes oblongus.	—— cristatum.
Hister Felipæ.	Teretrius latebricola.
—— hamatilis.	Hypocaccus asper.

*Phylloma labrosum*, sp. n.

Oblongum, subdepressum, nigrum, nitidum; fronte obscure bistriata, labro elongato, mandibulis antice depressis; elytris striis, 1 late interrupta, appendiculata, 2 brevi, obsolete appendiculata, 3 brevissima; pygidio transversim punctulato; tibiis anticis 4-dentatis. L.  $9\frac{1}{2}$  mill. (absque mandibulis).

Oblong, rather depressed, black and shining; the head, surface uneven, impressed anteriorly, forehead with two short transverse lines, labrum large and bilobed, lobes somewhat oblique, mandibles very robust at their bases and anteriorly depressed from the middle, each with an inner well-marked tooth, tips acuminate; the thorax transverse, lateral stria fine and lightly impressed, ceasing at the anterior angle; the elytra, subhumeral sulcus shallow and abbreviated before and behind, at the shoulder close to the base is a very short oblique line pointed towards the first stria, the first stria is well-marked at the base, interrupted in the middle, the apical portion is lightly impressed and there is an indication of an appendage to the third stria, which is extremely short; the propygidium is sparsely punctulate on its outer border and there are two shallow impressions posteriorly; the pygidium is smooth at the apex and also more narrowly along the base, leaving a transverse space somewhat closely punctured; the prosternum is rather wide at the base, but not distinctly angulate, and the anterior part of the keel is depressed; the mesosternum is widely emarginate; the anterior tibiæ are 4-dentate.

The form of the mandibles and the size of the labrum serve as good specific characters to distinguish this insect.

*Hab.* Val du Rio Pardo, São Paulo, December 1898 (*E. Gounelle*).

*Phylloma tuberculatum*, sp. n.

Oblongum, subdepressum, nigrum, nitidum; fronte in medio leviter tuberculata; elytris stria dorsali 1 brevissima, 2 brevi cum appendice, 3 brevior; propygidio bifoveolato, punctis sparsis cincto; tibiis anticis 5-dentatis.

L.  $8\frac{1}{2}$  mill. (absque mandibulis).

Oblong, rather depressed, black and shining; the head, surface obscurely punctulate, concave anteriorly, with a small tubercle in the centre of the forehead, mandibles falciform, each with an indication of a tooth only, labrum small, short and bilobed; the thorax, lateral stria fine and close to the margin, ceasing behind the eye; the elytra, subhumeral sulcus is shallow and abbreviated at either end, dorsal striæ, 1 very short and basal, 2 much longer, with a fine punctiform appendage, 3 half the length of the second; the propygidium has an outer margin of scattered punctures and is bifoveolate at its apex; the pygidium has smaller and more closely set punctures over its whole surface; the prosternum is flat and angulate behind the coxæ; the mesosternum is widely emarginate; the anterior tibiæ are 5-dentate, the two apical teeth having a base common to both.

This and *P. monodon*, Mars., are the only species of the genus known with a frontal tooth.

*Hab.* Cerqueira Cesar, São Paulo, January 1899 (*E. Gounelle*).

*Hololepta caudicalis*, sp. n.

Oblonga, depressa, nigra, nitida; fronte bistriata; pronoto lateribus conspicue punctato, antice bisinuato; elytris striis, 1 brevi, 2 brevior appendiculata; propygidio late circumpunctato; pygidio ♂ transversim punctulato; tibiis anticis 4-dentatis.

L.  $7-7\frac{1}{2}$  mill. (absque mandibulis).

Oblong, depressed, black and shining; the head with two bent striæ behind the mandibles, surface with an extremely fine punctuation; the thorax, anterior edge bisinuous, finely marginate laterally and more strongly at the anterior angles, the sides have a broad margin of conspicuous punctures in ♂, punctures less conspicuous in ♀; the elytra, humeral sulcus rather deep and abbreviated at either end, 1 dorsal stria short but well-marked, 2 much shorter, with an appendage which varies in length and is sometimes absent. Of six examples one has no appendage, one an appendage one third of the elytral length, several with a longer appendage evanescent anteriorly. The propygidium is apically biimpressed,

has a circle of punctures, punctures largest on each side; the pygidium, the upper portion is smooth in ♂, with a transverse band of punctures before the apex, in ♀ the punctures are more scattered and the smooth upper portion less defined; the prosternum is broad and widened out at the base; the mesosternum is laterally margined on the anterior portion only; the anterior tibiæ are 4-dentate.

In the specific sequence this insect may be placed next to *H. Truxillana*, Mars.

*Hab.* Valley of the Rio Pardo, São Paulo, Brazil (*E. Gounelle*).

*Hololepta canaliculata*, sp. n.

Ovalis, subparallela, parum depressa, nigra, nitida; fronte transversa, labro brevissimo; thorace post angulos conspicue canaliculato; elytris striis 1-2 brevibus, 2 appendiculata; pygidio dense punctato, apice anguste lævi; tibiis anticis obtuse dentatis.

L.  $9\frac{1}{2}$  mill. (absque mandibulis).

Oval, rather parallel at the sides, somewhat depressed, black and shining; the head transverse and similar to that of *H. excisa*, Mars., without striæ, labrum transverse and very narrow and anteriorly sinuous; the thorax impunctate, with the marginal striæ widening out anteriorly into a deep furrow, the furrow is deepest in front and abruptly terminates before the anterior angle, the angle in ♂ is feebly emarginate, similar in this respect to *H. vulpes*, Mars., anterior edge seen to be very feebly sinuous when viewed vertically; the elytra, humeral sulcus is shortened at both ends, dorsal striæ, 1 basal and short, 2 half the length of the first at the base, but with an appendage four times its own length; the propygidium is somewhat widely but sparsely punctured at the sides, the punctures are small and circular; the pygidium has similar punctures, but they are densely set with a narrow smooth apical margin; the menton is smooth and concave, with a small fovea on the posterior point of the concavity; the prosternum widens triangularly at the base; the mesosternum is striate on either side; the anterior tibiæ are very obtuse and the two apical teeth have a common base.

In outline this species resembles *H. menadia*, Mars., but the thoracic furrow agrees with *H. canalicollis*, Lew., except that it is deeper and is shortened before the anterior angle.

*Hab.* Paramba, alt. 3500 feet (*Rosenberg*). One male.



*Niponius canalicollis*, sp. n.

Cylindricus, elongatus, niger, nitidus, punctatus; frontē obtuse cornuta; thorace in medio longitudinaliter profunde canaliculato; propygidio pygidioque conspicue bifoveolatis; prosterno marginato, striis postice conjunctis.

L.  $3\frac{1}{2}$ – $4\frac{1}{2}$  mill.

Cylindrical, elongate, black and shining, tarsi palish; the head is somewhat robust, sulcate between the cephalic projections, which are smaller and shorter but relatively wider at the base than those of *N. impressicollis*, Lew.; the projections also are less conspicuously transversely carinate, the punctuation on the surface is clear and fairly close, and closer and more irregular at the middle of the base; the thorax has a very conspicuous median channel, which sometimes reaches the base but is always somewhat shortened in front, on either side of the channel the surface is uneven and the punctures irregular in size and form; the elytra, the sutural and one humeral stria are complete, the others punctiform or obsolete. The dorsal striæ in the species of this genus do not usually provide specific characters. The foveæ in the pygidia resemble those figured for *N. osorioceps* (Trans. Ent. Soc. Lond. pl. viii. 1885), but they are larger and more circular in outline; the prosternum, the keel is margined with a stria very clearly joining at the base, anteriorly the striæ are shortened before the suture, and at the suture there is a transverse impression; the meso- and metasterna are deeply canaliculate in the middle and the metasternum is laterally striate, all the sterna are sparsely punctured; the tibiæ are rather slender, resembling those of *osorioceps*, Lew. The tibiæ of *N. Andrewesi*, Lew., another Indian species, are much broader.

*Hab.* N.W. Himalayas (*E. P. Stebbing*).

*Pachycærus præliaris*, sp. n.

Ovalis, parum convexus, cæruleo-metallicus; antennis pedibusque piceis; pronoto stria marginali post capite interrupta; elytris striis 1–4 integris, 5 apicali, suturali basi abbreviata; prosterno bistriato; mesosterno stria integra, arcuata; tibiis anticis 4-dentatis, dente apicali minute bifido.

L.  $3\frac{1}{4}$ – $3\frac{1}{2}$  mill.

Oval, somewhat convex, metallic blue; the forehead feebly convex between the eyes, impressed anteriorly, marginal stria well-marked and rather more arched anteriorly than that of *P. cyanescens*, Er., surface sparsely punctured, punctures

largest along the base; the thorax, anterior angles somewhat depressed, punctured laterally, points fine or evanescent on the disk, antescutellar fovea small and shallow, marginal stria complete but very fine behind the head; the elytra, striæ, outer humeral apical and dimidiate, inner humeral wanting, 1-4 dorsal complete, 5 apical, not quite dimidiate and sometimes punctiform, sutural apical, parallel to the suture, and extending just beyond the middle, the apices of the elytra are sparingly punctured; the propygidium and pygidium are evenly but not densely punctured (*i. e.* very similar to those of *cyanescens*, Er.). The prosternum is narrower than in Erichson's species, and the striæ are consequently nearer together and posteriorly are relatively more divergent; the mesosternum is margined with a stria, which is simply bowed anteriorly, not sinuous as in *cyanescens*. The anterior tibiae are 4-dentate, the apical tooth being minutely bifid.

This species is nearly the same size and shape as *P. cyanescens*, Er., and *P. coeruleatus*, Lew., but the thorax is rather more narrow anteriorly and the outline therefore somewhat more oval.

*Hab.* Salisbury, Mashonaland; December 1900, under *Acacia*-bark (Guy A. K. Marshall).

*Baconia jubaris*, sp. n.

Late ovata, depressa, supra viridis metallica, pedibus obscure brunneis; fronte concava; pronoto post angulos impresso; elytris striis 4-5 et suturali nullis; prosterno bistriato; mesosterno, stria marginali late interrupta, stria transversa tenuiter impressa; tibiis anticis 5-dentatis.

L.  $2\frac{2}{3}$  mill.

Broadly oval, depressed, above green and metallic, head and thorax with a slight golden tinge; the head, forehead concave, finely striate over the eyes, punctate, points not dense but varying in size, largest are near the middle of the base, the labrum is narrow, transverse, and straight anteriorly; the thorax, marginal stria complete, anterior angles rounded off, with an oblique impression behind them, the punctuation is extremely fine on the disk, closer and larger and a little rugose on the sides; the elytra, striæ, inner humeral very fine and complete, 1 also complete, 2 complete but somewhat evanescent at the base, 3 basal evanescent and punctiform on the apical half, the apical border is punctured but not densely, and there are similar punctures on the pygidia; the prosternum, anterior lobe is margined anteriorly with a fine stria, keel bistriate, striæ parallel at the sides, finest and almost

joining at the base; the mesosternum has a short bent stria at either anterior angle and a very fine, transverse, slightly bent stria before the suture which joins the metasternal lateral stria; the first abdominal segment has a lateral stria which is sinuous behind the coxæ and reaches the apex, and there is an apical dimidiate outer stria; the anterior tibiæ are 5-dentate and the teeth are at equal distances apart.

*Hab.* S. Antonio da Barra, Bahia, 11th December, 1888 (*E. Gounelle*).

*Baconia choaspites*, sp. n.

Breviter ovata, subdepressa, viridi-cyanea, nitida; antennis pedibusque piceis; fronte leviter impressa; pronoto post angulos foveolato; elytris striis 5 et suturali nullis; prosterno bistriato; mesosterno stria marginali interrupta, stria transversa arcuata, utrinque abbreviata; tibiis anticis 4-dentatis.

L.  $2\frac{2}{3}$  mill.

Shortly oval, rather depressed, greenish blue, shining; the thorax is rather less blue than the elytra; the head, forehead impressed, labrum narrow, with an arcuate outline anteriorly, surface with a few irregular punctures large and small, outline emarginate before the eye, without striæ; the thorax somewhat sparingly punctured laterally, marginal stria complete, behind the anterior angles is a small fovea, the scutellar puncture is small but distinct; the elytra, humeral stria wanting, 1 and 2 complete and somewhat crenulate and joined at the base, 3 complete but fine apically, 4 basal and bent towards the suture with an apical punctiform appendage, 5 is represented by an apical line of punctures; the pygidia are sparingly punctured; the prosternum, anterior lobe is margined with a somewhat strong stria anteriorly, but the stria at the sides is represented by punctures only, keel bistriate, striæ parallel to each other and not joining at either end; the mesosternum, marginal stria is interrupted anteriorly, and before the metasternal suture there is a transverse bent crenulate stria in the middle which is well-shortened on either side, the sutural stria is very fine and joins the metasternal lateral stria, which is more marked; the first abdominal segment has a sinuous lateral stria which does not reach the apex; the anterior tibiæ are 4-dentate, the three nearest the tarsi are obtuse.

*Hab.* Serra de Communaty, Pernambuco, 11th March, 1893 (*E. Gounelle*).

*Baconia Gounellei*.

*Phelister Gounellei*, Mars. Bull. Soc. Ent. Fr. (6) vii. p. cxviii (1887).

*Hab.* Caraca, Minas Geraes, Brazil (*E. Gounelle*, 1885).

The type of the above is now in my collection, and I find it agrees in all its characters with the species I have placed in *Baconia*. I do not include *Phelister micans*, *fulgidus*, and *angustus*, Sch., in *Baconia*, because in these species the mesosterna are bisinuous and they have a sutural stria. There are about 120 species of *Phelister* now described, and there are 30 new species in my collection, and it is very desirable to separate some of these if satisfactory generic characters can be found.

*Omalodes oblongus*, sp. n.

Oblongus, parum convexus, niger, nitidus; fronte foveolata, stria circulari antice haud retrorsum acuminata, clypeo late canaliculato; pronoto post angulos leviter punctulato; elytris striis dorsalibus 1 integra, 2 basi abbreviata, 3 dimidiata; tibiis anticis 5-dentatis.

L.  $7\frac{1}{4}$  mill.

Oblong, black and shining; the head, surface punctulate, deeply foveolate on the vertex, stria semicircular in outline, but not quite meeting in the middle, the clypeus is lightly but widely canaliculate; the thorax, marginal stria very fine except in the region of the anterior angles, slightly sinuous behind the eyes, lateral stria complete, surface feebly punctured behind the anterior angles, angles a little acute; the elytra, striæ, inner humeral dimidiate, apical, and widely sinuous, 1 dorsal complete, 2 more marked and shortened at the base, 3 dimidiate and basal, 4 represented by a puncture or small fovea near the base; the propygidium is sparsely punctured and the punctures on the pygidium are finer and more closely set; the prosternum is without striæ and smooth; the mesosternum has a bent stria on either side; the anterior tibiæ are 5-dentate, but the apical tooth is large and obtuse, with four small denticulations along its edge.

The oblong form of this species is similar to that of *O. faustus*, Mars.

*Hab.* Valley of the Rio Pardo, São Paulo, December 1898 (*E. Gounelle*).

*Hister Felipæ*, sp. n.

Oblongus, subcylindricus, niger, nitidus; fronte leviter bifoveolata, stria antice bisinuata; pronoto striis marginali et laterali integris; elytris striis humerali, subhumerali et 1-4 integris, 5 et suturali basi abbreviatis; pygidio vix dense punctato; tibiis anticis dilatatis, 5-dentatis.

L.  $6-6\frac{1}{2}$  mill.



Oblong, somewhat cylindrical, black and shining; the head, surface sparingly punctulate, with two shallow foveæ placed transversely just before the vertex, frontal striæ complete and anteriorly bisinuous; the thorax, marginal stria complete and posteriorly continues round the angle and joins the lateral stria, lateral stria also complete and crenulate behind the anterior angles and along the front, there are a few irregular punctures along the inner side of the lateral stria, the surface has an extremely fine punctuation and the scutellar fovea is small but well-marked; the elytra, striæ, inner and outer humeral are complete and sinuous, the sinuosity of the first is near the humerus, 1-4 straighter and all complete, the third is bent away from the second at the base, 5 is dimidiate but in one example is in certain lights traceable to the base, the sutural extends beyond the middle; the propygidium and pygidium are evenly but not densely punctured, the punctures are somewhat closer together on the pygidium; the prosternum, the anterior lobe is marginate and rather roughly punctured, keel smooth; the mesosternum is rather widely sinuous, marginal stria complete and crenulate; the anterior tibiæ are somewhat dilated and 5-dentate.

In form this species resembles *Pachycræus chalybæus*, Fähr. It may be placed in the catalogue next to *Hister remotus*, Lec., which it somewhat resembles, but it is more oblong and cylindrical.

*Hab.* Iowa City, September 1898 and March 1900 (*H. F. Wickham*).

*Hister hamatilis*, sp. n.

Ovatus, convexus, niger, nitidus; fronte parce punctulata; pronoto stria laterali antice hamata; elytris striis 1-3 integris, 4 basi abbreviata, appendice arcuata, 5-6 fere dimidiata; prosterno bistriato; tibiis anticis 5-6-dentatis.

L. 4 mill.

Oval, convex, black and shining; the head rather narrow, surface moderately punctulate, stria complete, arched, but a little straight anteriorly; the thorax, marginal stria fine and complete, lateral sinuous in the middle and a little shortened at the base, bent anteriorly and ceasing behind the eye, the anterior edge is conspicuously bisinuate, anterior angles somewhat depressed, scutellar fovea small but clear; the elytra, striæ, inner humeral is shortened a little at the base only and anteriorly is conspicuously sinuous, oblique stria very fine, dorsal 1-3 complete, 4 a little shortened at the base with a short bent rudiment, 5 dimidiate, and the sutural is a little



longer; the propygidium is impressed posteriorly on either side, and with the pygidium is clearly but not very closely punctured; the prosternum, keel with a fine marginal stria which continues along the sides of the posterior lobe, but does not join behind, anteriorly the striæ are a little divergent; the mesosternum is feebly sinuous anteriorly and margined with a fine stria; the anterior tibiæ are 5-6-dentate.

This species agrees with *H. stenocephalus*, Lew., and *H. sinuaticollis*, Lew., in the form of the thorax, and with *H. indicus*, Lew., in its general outline and dorsal striæ. The lateral thoracic stria being hamate anteriorly distinguishes it from all the described species.

*Hab.* Mount Kinabalu, North Borneo.

*Hister sectator*, sp. n.

Ovatus, convexus, niger, nitidus; fronte stria integra; thorace stria laterali obliqua basi abbreviata; elytris striis humerali interna et 1-3 integris, 4 basi abbreviata vel evanescenti, 5-6 dimidiatis; pygidio vix dense punctato; prosterno angusto haud striato; mesosterno fere truncato, marginato.

L.  $4\frac{1}{2}$  mill.

Oval, convex, black and shining; the head, frontal stria not very strong and feebly bisinuous anteriorly; the thorax, anterior outline semicircular, marginal stria fine and joining the lateral stria behind the eye, lateral stria oblique, shortened before the hinder angle, lateral interstice rather wide; the elytra, striæ, inner humeral and 1-3 complete, oblique basal extremely fine, 4 shortened at the base with a trace of completeness seen in certain lights, 5 dimidiate, sutural slightly longer and apically bending a little away from the suture, all the striæ are slightly crenulate; the propygidium is evenly and rather closely punctured; the pygidium similarly punctured, but the points are a little more dense; the prosternum has a narrow keel and the posterior lobe is small and triangular behind the coxæ; the mesosternum is marginate and feebly arched anteriorly; the anterior tibiæ are 5-6-dentate.

*H. sectator* is readily distinguished from *H. philippinensis*, Mars., by its oblique thoracic stria.

*Hab.* Mount Kinabalu, North Borneo.

*Hister Baberii*, sp. n.

Ovalis, convexus, niger, nitidus; fronte stria integra arcuata; thorace utrinque impresso, stria interna obliqua basi parum abbreviata; elytris striis 1-3 integris, 4-5 et suturali basi abbreviatis; mesosterno antice truncato.

L.  $4\frac{1}{2}$  mill.

Oval, convex, black and shining; the head, frontal stria arched, not very strong, and minutely irregular anteriorly; the thorax, lateral stria oblique, distinctly shortened at the base, and continuing behind the head is sinuous behind the eye, it is crenulate between the foveæ, which are similar to those of *cælestis*, but impunctate or nearly so; the elytra, the inner humeral sulcus is rather deep and median, nearly equally shortened at either end, dorsal striæ 1-3 complete, 4 well shortened at the base, 5 dimidiate, sutural almost as long as the fourth and apically it turns slightly from the suture; the propygidium and pygidium are punctured similarly to the corresponding segments in *H. myrmidon*, Mars.; the prosternum, the anterior lobe is rather closely punctured and margined with a narrow border; the mesosternum is truncate anteriorly, with the marginal stria complete, and on the middle of the posterior edge is a circular and very conspicuous fovea; the tibiæ are formed like those of *H. silvicola*.

*Hab.* North-west India (*Janson*).

*Hister silvicola*, sp. n.

Breviter ovalis, convexus, niger, nitidus; fronte stria integra, valida, arcuata; thorace post angulos foveolato, stria laterali integra; elytris striis 1-4 integris, 5 dimidiata, suturali longiuscula; propygidio parce punctato; pygidio vix distincte punctulato.

L. vix 4 mill.

Shortly oval, convex, black and shining; the head, stria strong, complete, and simply arched from the eyes forward; the thorax, anterior outline semicircular, lateral stria is feebly oblique and does not quite reach the base, anteriorly it is complete and slightly sinuous behind the eye, the marginal stria is fine and ceases behind the eye, the impression or fovea behind the anterior angle is more marked than that of *H. cælestis*, Mars., and on the disk in a line behind each eye is a small shallow fovea. I think this last is a permanent character, but I possess only one example. The elytra, striæ, inner humeral is short and rather deep and is nearer the shoulder than the apex, dorsal striæ 1-4 complete, 5 dimidiate, sutural a little longer and apically bending towards the fifth; the propygidium is sparsely punctured, the points are similar to those of *H. myrmidon*, Mars.; the pygidium is less distinctly punctulate; the prosternum, the anterior lobe is irregularly punctate and the rim somewhat thickened; the mesosternum is feebly angulate in the middle and margined with a rather fine stria; the metasternum also has a complete

stria feebly crenulate; the anterior tibiæ are 4-5-dentate and widened out apically.

*Hab.* Khasia Hills, July 1894.

*Paratropus altilis*, sp. n.

Breviter ovalis, convexus, piceo-niger, nitidus, pedibus rufo-brunneis; fronte stria integra utrinque angulata, haud impressa; elytris 1-3 parum validis integris, 4 basi arcuata, 5 apicali, suturali antice evanescente; prosterno angustissimo, bistriato; mesosterno acuminato, marginato; tibiis dilatatis.

L.  $3\frac{1}{2}$  mill.

Shortly oval, convex, almost black, shining, antennæ and legs reddish brown; the head slightly convex above, obscurely punctulate, stria complete and angulate laterally before the eyes; the thorax clearly but not thickly punctulate before the scutellum, on other parts the points are very fine, marginal stria complete; the elytra, striæ, inner and outer humeral complete, the first slightly carinate, dorsal striæ 1-3 complete, rather strong and at the base bent towards the suture, 4 is complete and hamate at the base, 5 apical and dimidiate, sutural is longer, fine, and evanescent anteriorly; the propygidium and the pygidium have a shallow, sparse, and somewhat obscure punctulation; the prosternum is bistriate and its keel very narrow, and the anterior lobe is arched, not sinuous, with a well-marked raised marginal edge; the mesosternum is acuminate and the marginal stria fine and complete.

*Hab.* Usambara, E. Africa.

*Paratropus boleti*, sp. n.

Breviter ovalis, convexus, niger, nitidus, antennis pedibusque rufis; fronte, stria integra utrinque angulata, antice recta; elytris striis 1-4 dorsalibus et suturali integris, 4 basi cum suturali arcuatim juncta, 5 basi abbreviata; prosterno tenuissime bistriato; tibiis anticis multispinosis.

L.  $2\frac{1}{3}$  mill.

Shortly oval, convex, black and shining, antennæ and legs red; the head finely, evenly, and rather sparingly punctulate, stria complete, carinate, angulate before the eyes and transversely straight in front behind the clypeus; the thorax more distinctly punctulate than the head, points clearest before the scutellum (where there is a shallow impression) and along the base, it is narrowest at the anterior angles, marginal stria complete and strongest laterally; the elytra, striæ, inner and outer humeral complete, oblique basal fine

but clearly defined, dorsal 1-4 and sutural complete, sutural joining the fourth at the base, 5 shortened before the base, 4-5 and sutural are finely crenulate; the propygidium and pygidium are somewhat sparsely punctulate; the prosternum, striæ extremely fine and only traceable before the coxæ, but there is a short marginal stria, also extremely fine at the base opposite the coxæ, the mesosternal stria is complete and also fine, but not so fine as the prosternal striæ, the transverse stria is crenulate; the metasternum has a few large shallow punctures at its base, especially in the area near the median coxæ; the anterior tibiæ are multispinose on the anterior edge, a characteristic of all the species of the genus.

*Hab.* Kuilu, French Congo (*Mocquerys*), 1892.

*Tylois mirificus*, sp. n.

Breviter ovalis, niger, nitidus; fronte rugose punctata; pronotum angulis anticis rufis, basi utrinque profunde excavata, parte anteriore punctata; elytris striis punctiformibus, tenuiter impressis. L. 3 mill.

Shortly oval, gibbous in the region of the elytra, black and shining; the head rugosely punctured, lateral margins carinate, clypeus truncate anteriorly, constricted behind, labrum short, transverse and smooth; the thorax, anterior angles prominent, obtuse, and reddish brown, anterior area conspicuously and rather closely punctate, impressed behind the anterior angles, feebly carinate behind the middle of the neck, posterior area is nearly smooth in front of the scutellum, and on each side opposite the middle of each elytron is a deep lobe-shaped excavation, and on the outer side of each excavation is a narrow comma-shaped sulcus; the elytra are bordered with a lateral carina which represents the inner humeral stria, the carina is very strong at the base, and outside of it close to the base is a short strong carina which apparently represents the humeral oblique stria, behind the region of the thoracic excavations there are on each elytron close to the base three short elevated ridges, the six dorsal striæ are almost obsolete, being merely indistinctly represented by lines of fine punctures, the sutural stria is the most complete; the propygidium and pygidium are somewhat opaque and obscurely and sparsely punctulate; the prosternum is tuberculate anteriorly, bistriate, striæ divergent before and behind, keel smooth; the mesosternum is 3-tuberculate and densely punctate; the first segment of the abdomen is punctate, but smooth in the middle; the anterior tibiæ are 4-5-dentate, the median and hind tibiæ are angulated in the middle.



This species evidently much resembles *T. mirabilis*, Sch., which I only know by description. I have compared it with *T. trilunatus*, Mars., of which there are three examples in the Museum in Paris.

*Hab.* Pery-Pery, Pernambuco, 5th June, 1892 (*E. Gounelle*).

*Homalopygus geminatus*, sp. n.

Oblongo-quadratus, subdepressus, piceus, nitidus; fronte stria integra utrinque angulata; thorace lateribus reflexis; elytris striis 1-4 integris, 5 nulla, suturali geminata, dimidiata; pygidio postice margine reflexo, subtus lævi; tibiis extus valde dilatatis. L. vix 3 mill.

Oblong, somewhat quadrate, rather depressed, piceous and shining; the head, surface very finely and sparingly punctulate, slightly impressed anteriorly, marginal stria complete, well-marked, and angulate at the sides; the thorax very feebly convex, impressed laterally, with the margins reflexed, the lateral rim continues behind the head in the form of a very fine stria close to the edge, punctuation sparse and microscopic; the elytra, striæ, inner humeral fine, carinate, and complete, 1-4 fine and complete, the fourth bending towards the suture at the base, 5 absent, sutural geminate, parallel to the suture and reaching the middle from the apex, the punctuation is more distinct than that of the thorax, especially between the fourth and sutural striæ; the propygidium is transverse and densely punctulate, somewhat opaque, with the lateral edge reflexed; the pygidium on the upper surface is sculptured like the propygidium, and it is semicircular behind, with the rim distinctly raised, beneath it is smooth and lies entirely under the upper portion; the prosternum is bistriate, striæ finest and most divergent in front, anterior lobe with shallow rugose punctures; the mesosternum has a short but fine stria at each of the anterior angles and a fine and complete marginal stria anteriorly, but it is not close to edge; the tibiæ are all dilated.

The species resembles *H. latipes*, Bohem., from Panama, especially in the form of the pygidium and legs (see fig., Mars. Mon. 1861, pl. iv. fig. 1). It differs considerably from *H. remex*, Lew., a species which has no frontal stria and a simple convex pygidium.

*Hab.* S. Antonio da Barra, Bahia, December 1883 (*E. Gounelle*).

*Teretriosoma unicolorne*, sp. n.

Cylindricum, parum elongatum, viride metallicum, antennis pedi-



busque rufis ; fronte parum minute tuberculata ; elytris basi conspicue sulcatis ; mesosterno immarginato ; pygidio apice leviter concavo ; tibiis anticis 7-dentatis.

L.  $2\frac{2}{3}$  mill.

Cylindrical, somewhat elongate, green and metallic ; the head, scape of antennæ in ♂ clothed with long flavous hair, feebly convex on the vertex, depressed anteriorly, surface ocellately and densely punctate ; the epistoma has a small but distinct tubercle in the middle, at its base and on each side of it there is a transverse rugose ridge which is not so conspicuous, before the tubercle the epistoma is reddish and the upper margin of the eye is feebly striate ; the thorax, the punctures on the disk are smaller and much less dense than those of the head, marginal stria complete but fine and close to the edge anteriorly ; the elytra, basal edge narrowly smooth, punctured generally like the disk of the thorax, and along the bases there is a conspicuous rather wide depression or furrow, it passes round the humeral angle, but does not reach beyond the middle in the sutural direction ; the propygidium and pygidium are densely punctured, and the apex of the latter, which is depressed and marked off from the base by a transverse ridge, is, under the microscope, seen to be ocellately punctured ; the prosternum is narrowly marginate and wide, especially in front ; the mesosternum has a short stria at each anterior angle ; the metasternum has a distinct lateral stria.

The punctuation beneath is very similar to that of the thorax, but is rather more sparse in the median area of the metasternum ; the anterior tibiæ are 7-dentate, the two apical are close together and separate from the others.

I have not seen the female of this species.

*Hab.* S. Antonio da Barra, Bahia, 11th December, 1888 (*E. Gounelle*). Two males.

*Teretriosoma Stebbingii*, sp. n.

Cylindricum, subelongatum, piceo-brunneum, nitidum, supra sat dense punctatum ; fronte antice depressa ; pronoto margine antice in medio anguste elevato ; antennis pedibusque rufis.

L.  $2\frac{2}{3}$  mill.

Cylindrical, somewhat elongate, pitchy brown, shining, rather densely punctured above ; the head, the punctures are larger than those behind the neck and most dense at the base, under the microscope some are ocellate, the fore part of the forehead and the epistoma are depressed, and sometimes there is a median circular impression or shallow fovea in the

epistoma, there is a stria over the eyes; the thorax is microscopically rugose (the head is less distinctly so), the punctures are smallest behind the neck, all are more or less ocellate, the marginal stria is complete, sides sinuous and the marginal rim behind the middle of the neck is slightly elevated; the elytra are wholly sculptured like the thorax and there is no smooth margin along their bases, which is frequently the case in this genus; the pygidia are sculptured like the elytra, in ♂ the apex is circularly flattened and near the middle of the circle is a small but conspicuous acuminate tubercle, with smaller and less distinct muricate processes round the edge of the flattened circle; the prosternum, the keel is broad and feebly sinuous and narrowly marginate anteriorly; the mesosternum anteriorly has a narrow smooth border, but there is no stria, all the sternal plates have large shallow punctures, very evenly but not closely set together; the first abdominal segment has similar points also; the legs are reddish brown, anterior tibiæ 6-7-dentate.

*Hab.* N.W. India (*E. P. Stebbing*). Only the male is known.

*Teretriosoma cristatum*, sp. n.

Cylindricum, piceum, nitidum, undique punctatum; fronte minute foveolata; elytris transversim basi haud impressis; pygidio convexo; prosterno utrinque breviter sulcato; mesosterno antice immarginato; tibiis anticis 6-7-denticulatis.

L.  $2\frac{1}{2}$  mill.

Cylindrical, thorax rather more convex than the dorsal region, piceous, shining, the scape of the antennæ in ♂ bearing long palish hairs; the head, vertex minutely foveolate, epistoma rather broad and truncate anteriorly, surface, except in the region of the fovea, rather coarsely and rather densely punctured, striate over the eyes; the thorax, anterior angles obtuse and depressed, very feebly sinuous laterally, lateral stria well-marked but is not traceable behind the head, the punctuation is smaller than that of the head and less dense, especially on the disk and behind the neck; the elytra are wholly punctured, similarly to the densest part of the thorax, and there is no basal smooth border; the propygidium and pygidium are wholly punctured like the elytra, except that the pygidium is somewhat rugose at the apex, the propygidium has a faint longitudinal median impression, the pygidium is almost circular in outline and convex; the prosternum is coarsely and evenly punctured, before each coxa there is a short longitudinal furrow, but it is not in the place nor does it seem to correspond with the ordinary striæ on the keel in *Teretrius*;

the mesosternum is very obtuse anteriorly and immarginate, the punctuation on it and the metasternum is similar to that on the keel of the prosternum, behind the intermediate coxæ there is a similar sulcus to that noted on the prosternum; the first abdominal segment is only sparsely punctulate in the middle; the anterior tibiæ are 6-7-dentate.

*Hab.* N.W. India (*E. P. Stebbing*).

The male also of this species is alone known.

*Teretrius latebricola*, sp. n.

Cylindricus, elongatus, niger, nitidus; fronte in medio leviter foveolata; pronoto stria integra ad angulos subcarinata; prosterno striis obsoletis; tibiis anticis 6-dentatis.

L.  $2\frac{2}{3}$  mill.

Cylindrical, elongate, black and shining; the head rather closely punctured except on the vertex, which is lightly foveolate and, in and around the fovea, the punctures are larger and less close; the thorax, the punctures are very similar to those of the head, especially behind the neck, on the disk they are rather less close, and there is a small, narrow, longitudinal, smooth space before the scutellum, the marginal stria is well-marked and somewhat carinate at the anterior angles, and it is also a little raised behind the head; the elytra, striæ obsolete, punctured like the thorax; the prosternum, anterior lobe feebly sinuous and marginate, surface microscopically strigose, punctate, punctures are somewhat closely but not densely set, some, especially those in the middle, are oval (the meso- and metasterna and the first segment of the abdomen are similarly punctured), the lateral striæ are almost obsolete, being but faintly traceable between the coxæ; the mesosternum is somewhat strongly marginate at the sides and the stria continues along the lateral margin of the metasternum, but behind the prosternal keel the stria is punctiform and indistinct; the propygidium and pygidium are evenly, somewhat finely, rather closely, but not densely punctured; the anterior tibiæ are 6-dentate.

There is no doubt this species is different from *T. obliquulus*, Lec., and *T. levatus* and *montanus*, Horn, but all these species require redescription. Dr. Horn considered *T. americanus*, Lec. (see 'Synopsis,' 1873, p. 346), doubtfully distinct from the European *T. picipes*, but an example I have, taken by Mr. Morrison in Montana, and, I believe, named by Dr. Horn *americanus*, is a species of *Teretriusoma*.

*Hab.* "Central New York" State (*H. F. Wickham*).

*Hypocaccus asper*, sp. n.

Ovalis, convexus, fere niger, parum nitidus, supra undique dense punctatus; fronte stria integra antice carinata; pronoto lateribus rugoso-punctato; elytris striis 1-4 fere integris, suturali parte geminata; prosterno angusto, striis approximatis.

L.  $2\frac{1}{2}$ -3 mill.

Oval, convex, black, densely punctured above, and more coarsely and conspicuously punctured on the mesosternum; the head rugosely punctured, frontal stria complete and cariniform over the eyes and anteriorly; the thorax punctured like the head, interstices rugose except on the disk, marginal stria complete but extremely fine behind the head, punctured like the head, with interstices generally longitudinally rugose, striæ, outer humeral complete, inner short and median, 1-4 almost complete but apically somewhat obliterated by the punctuation, sutural complete, geminate on the dorsum, and joining the fourth at the base, it also continues along the apical rim, which is very narrowly smooth; the pygidia are densely punctured; the prosternum, the keel is very narrow and the striæ are formed like those figured for *H. 4-striatus*, Hoffm. (Ann. & Mag. Nat. Hist. ser. 7, vol. iv. p. 2, 1899). The mesosternum is widely sinuous anteriorly, stria complete, surface punctate; the metasternum has a median longitudinal sulcus, deepest posteriorly, and the punctures are large along the hinder border; the anterior tibiæ are somewhat dilated and 6-7-dentate.

Superficially this species resembles the figure given by Marseul for *Saprinus delta*, but the frontal stria is carinate and straight anteriorly, and beneath the mesosternal stria is complete.

*Hab.* Bulawayo, Matabeleland, July 1900 (*Guy A. K. Marshall*).

XLVIII.—*A Preliminary Report on some new Brazilian Hemiptera.* By ADOLPH HEMPEL.

**Aphidæ.**

Genus CERATOVACUNA, Zehntner, 1897.

It will be necessary to revise the characters of this genus, as published by Dr. Leo Zehntner in 1897, from Java, in order to include the Brazilian species.

*Characters.*—Wingless form with antennæ of four joints,



joint 3 being longest. Honey-tubes represented by small orifices arising from a slight tubercle. No caudal tail present. Two large spines or horns project forward on the ventral surface between the antennæ. Larvæ and adults secreting a white wax, which may entirely cover them or may be in the form of a marginal fringe. Winged forms with antennæ of five joints, of which joint 3 is the longest. Wings folded horizontally on the back. Fore wing has the cubitus with one branch; the two oblique veins are united for a short distance at the base. Hind wings with two oblique veins. All forms viviparous.

Type *Ceratovacuna lanigera*, Zehntner. Java.

*Ceratovacuna brasiliensis*, sp. n.

*Adult wingless female*.—Ovate, convex, very dark brown; dorsum covered with a very thin colourless layer of wax; with a conspicuous narrow transverse band of white wax separating the thorax from the abdomen. The lateral margin is furnished with a conspicuous fringe of white wax, giving the insect the appearance of an Aleurodid. Dorsal derm hard, with a transverse groove between thorax and abdomen, and a number of small hairs scattered over it. It does not soften after prolonged boiling in a solution of KOH. The lateral margin is ornamented by fine regular crenulations, due to the wax-glands it bears. Eyes small, black, divided into three divisions. On the anterior margin of the abdominal surface there are two stout horns or spines, varying from 68–80 microns in length. The ventral surface also bears two stout lance-shaped spines and four stout hairs near the base of the antennæ.

Antennæ close together, of four joints, of which the third is the longest. Total length .252 to .290 millim. Length of joints in microns: (1) 47–54, (2) 43–47, (3) 112–122, (4) 43–72. All the joints bear hairs. Legs ordinary; tarsus with two long slender digitules with ends slightly expanded, and with two to four slender hair-like digitules. Claw much curved, with a slight notch at the base. Cornicles small perforated tubercles, situated close to the lateral margin of the body. Cauda not developed. Rostrum short, extending about halfway to the second pair of legs. Total length 1.30 to 1.46 millim.; width 1.09 to 1.22 millim.

The larvæ are like the adult, but lighter in colour.

*Larva of the winged female*.—Light brown, ovate, slightly narrower than the preceding form, but of the same length. No waxy secretion present. The two spines on the anterior

border are indicated by two small tubercles. On the ventral surface near the anterior margin there are two groups of three spines each. These spines are tuberculate and lance-shaped, one pointing forward, the other two downward.

Antennæ of five joints, of which the third is the longest. Cornicles, cauda, claws, and digitules the same as in the preceding form.

*Adult winged female*.—Brown, the antennæ and dorsum of the thorax darker than the rest of the body. Antennæ of five joints, joint 3 the longest. Length .500 to .597 millim. Length of joints: (1) 36-43, (2) 29-36, (3) 234-277, (4) 108-133, (5) 93-108. Joints 1 and 2 short and globose; joints 3, 4, and 5 cylindrical, circled with numerous elevations, which, however, do not make complete rings, as the ends fail to meet on the dorsal surface. Eyes black. Three ocelli are present, one at the base of each antenna and the other on the anterior margin between the antennæ. Length of the body 1.27-1.41 millim. Legs ordinary. Cornicles, cauda, claws, and digitules similar to those of the other forms.

Wings colourless; veins brown. The costa of the anterior wings has one branch near the distal end. The two oblique veins are united for a short distance near their bases. Posterior wings with two oblique veins. When at rest the wings are folded horizontally on the back. Length of fore wing 2.05 millim.; extent 4.61 millim.

*Hab.* Campinas, Brazil, on a species of palm; S. Paulo, on another species of palm, on a species of *Epidendron*, and on *Cattleya Harrisonia*.

### Aleurodidæ.

Genus ALEURODES, Latreille.

*Aleurodes Youngi*, sp. n.

Full-grown larva broadly oval in outline, flat, usually bare and with no distinct fringe on the margin. Colour light yellowish to greyish; eyes small, dark chestnut-brown. Margin of body very thin, crenulated, with one pair of setæ on the anterior end and two pair on the posterior end. Vasi-form orifice large, broadly subovate in outline, situated about 0.100 millim. from the posterior margin of the body. Operculum short, subcordate, truncated posteriorly. Lingula not extending to the posterior edge of orifice; distal end expanded, cordate; edges serrated, with a pair of prominent setæ extending beyond the posterior edge of orifice. Length 1.10 millim.; width .80 millim.

Very young larva light greyish to yellowish, elliptical in outline, very flat; margin of body but slightly crenulated, but with a fringe of thirty-four large hairs or setæ. Antennæ and legs well developed, the latter with one long claw. Vasiform orifice large, broadly subovate in outline. Operculum elliptical, short, much wider than long. Lingula extending to the posterior edge of orifice, subspatulate, with the posterior half serrated and setose, terminating in a pair of long setæ.

Pupa light yellow in colour, of same size and shape as full-grown larva. Eyes very large, dark chestnut-brown. Marginal setæ and vasiform orifice as in full-grown larva.

Adult female light yellow in colour; wings creamy white, becoming colourless in balsam, covered with a fine white powder. Fore wings with a small dark spot at the distal end of the vein, which under the microscope shows that it is composed of a number of minute polygonal cells or areas. Eyes large, oval, but slightly constricted in the middle, dark chestnut-brown in colour. Antennæ of seven joints. Length .475 to .500 millim. Approximate length of joints in  $\mu\mu$ : (1) 21, (2) 70, (3) 147-175, (4) 56, (5) 70, (6) 59, (7) 53. The length of the joints varies in different individuals, but the relative proportions are preserved, these showing that joint 1 is very short, joint 3 very long, and joints 2, 4-7 are subequal. Legs very long. Length of insect .750-.940 millim.; extent of wings 3.150 millim.

Adult male: colour, antennæ, wings, and legs as in the female. Genitalia large, with a strong upward curve. Length .940 millim.; extent of wings 2.530 millim.

*Hab.* Iguape and Campinas, State of S. Paulo, Brazil; on cabbage and collards, usually preferring the underside of the leaves, but sometimes found scattered on the upper surface also.

The adults fly readily when disturbed. The damage done to the plants attacked is considerable, as the leaves become yellow, wilted, and covered with a white powder, being thus rendered unfit for use. This species is dedicated to Mr. Ernesto Young, of Iguape, who first sent specimens, and furnished the following notes on the life-history of the insect:—"The female lays about thirty-five eggs, sometimes in a semicircle, but frequently also in irregular clusters or singly, taking from thirty-five to thirty-six hours for the entire operation. The larvæ hatch from the eggs in sixty-eight to eighty-two hours, and in about five days become full-grown. The pupa stage lasts but a few days; so that, under favourable circumstances, the life-cycle is accomplished in from twelve to fifteen days."

*Aleurodes struthanthi*, sp. n.

Pupa broadly ovate or subcircular, slightly pointed, and narrower anteriorly than posteriorly, flat, hard, black or a mixture of black and yellowish. Dorsum bare, and no lateral fringe of wax present. Lateral margin of body not crenulated. In all specimens there is a narrow black marginal border. The rest of the dorsum is black except a  $\wedge$ -shaped yellowish patch near the anterior margin, with a small yellowish spot behind it on each side, and a semilunar space near the posterior margin of the same colour. In many specimens the dorsum shows a reticulated appearance as well as many fine radiating lines, especially near the margin. Surface or margin without hairs or setæ. Vasisform orifice about .400 millim. from the posterior margin of body, small, hemispherical. Operculum hemispherical, completely closing the orifice. Lingula small, subspatulate, with two lobes on each side and one terminal lobe. At the base of the orifice there is a pair of crescent-shaped thickenings. The scale is perforated at three places, posteriorly at the anal orifice and laterally at the first stigmatal areas. These perforations are very small and close to the margin. Length 2.20 millim.; width 1.90 millim.

Adult female unknown.

Adult male yellowish brown in colour; eyes large, black, dumbbell-shaped, nearly separated in the middle. Wings of a uniform smoky colour. Length of body 1.60 millim.; extent of wings 3.60 millim. The basal branch of the vein in the fore wing is but slightly developed. Legs long and hairy. Antennæ of seven joints, .805-.870 millim. long. Length of joints in  $\mu\mu$ : (1) 35, (2) 63-70, (3) 84-122, (4) 14, (5) 14-21, (6) 252-273, (7) 315-350. Genitalia well developed, forcipate; valves strongly curved at tip and furnished with a few hairs. Penis about  $\frac{2}{3}$  length of valves, bent upward with a slight gradual curve.

*Hab.* Paruahyba and S. Paulo. On *Struthanthus flexicaulis*, Mart., growing on orange, *Mechilia flava*, and an unidentified forest tree.

## Genus ALEURODICUS, Douglas.

*Aleurodicus Cockerellii*, Quaintance.

Grown larva and pupa yellowish, about 1.87 millim. long and 1.33 millim. wide; very flat; lateral edge thin. Dorsum covered with a dense thick mass of white secretion, arranged in a marginal fringe, and a submarginal oval ring.



Adult male light yellow in colour; head, eyes, wings, and antennæ as in the female. Body narrow, 2.21 millim. long. Extent of wings 4.93 millim. Genitalia large, .430 millim. long, forcipate, tips strongly curved. Penis fine, tip curved upward, .190 millim. long.

Eggs small, elongate, slightly curved, light yellowish, with a short peduncle; usually laid in an irregular mass and covered with a fine white powder. The eggs hatch in from 11 to 13 days. The larva stage lasts from 44–46 days, and the pupa stage from 15–16 days.

*Hab.* Campinas, State of S. Paulo, on the underside of leaves of a cultivated guava (*Psidium cattleianum*). The entire under surface of the leaves becomes coated with a fine white powder, while the upper surface is usually covered with a black fungus.

### Coccidæ.

Genus DACTYLOPIUS, Costa.

*Dactylopius subterraneus*, sp. n.

Female, gall-producing, on roots of cultivated grapes. Galls irregularly globose, 3–5 millim. in diameter, forming a mass encircling the entire root. The interior is smooth and lined with a white powder.

Female, probably immature, oval-convex, length of prepared specimen 2.52 millim.; width 1.50 millim. Antennæ of eight joints, all bearing hairs; joint 8 the longest. Length of antenna about .380 millim. Length of joints in  $\mu$ : (1) 56, (2) 42, (3) 56, (4) 31, (5) 31, (6) 35–38, (7) 38, (8) 84–91. Approximate formula: 8 (13) 2 (76) 45. Two small conical eyes present. Rostrum large, situated between the first pair of legs. Rostral loop extending halfway between the second and third pair of legs. Legs long. Length of joints of first pair of legs in  $\mu$ : coxa 91, femur and trochanter 245, tibia 140, tarsus and claw 91. Claw small, well curved; both pair of digitules small, with slightly expanded ends. Anal ring with six hairs. Anal tubercles inconspicuous, each ending in one seta. On the dorso-lateral surface of the body, including the anal tubercles, there is a series of 34 groups of spines; each group consisting of two thick sharp spines, with tuberculate bases, around which are clustered 6–8 round glands. The abdominal segments are distinct. The last 4–5 segments bear on the ventral surface many large round glands, while the dorsal derm bears many small tubular glands.

*Hab.* La Plata, Argentine Republic, on the roots of

cultivated grapes. Found by Dr. Carlos Spegazzini, and sent to the writer by Dr. H. v. Ihering of S. Paulo.

Genus CEROPLASTES, Gray.

*Ceroplastes campinensis*, sp. n.

Adult female scale light yellow in colour, irregular, oval in outline. Dorsum irregular, usually with three rounded humps, one anterior and two posterior. Dorsal nucleus alone present, depressed, slightly darker in colour than the surrounding wax. The individuals vary considerably, the very young specimens showing the three humps distinctly; while in the older specimens the dorsum becomes more convex and the humps are less conspicuous. There are also specimens that are very irregular and have the dorsum ornamented by a larger number of humps. Not divided into distinct plates. Length about 4 millim.; width 3 millim.; height 2.50 millim. Very old specimens are frequently larger. The widest part is posterior of the middle. On each side, at the stigmatal areas, there are two filaments of white wax that grow out at right angles to the body, often attaining a length of 1.25 millim.

Boiled in a solution of KOH, it colours the liquid carmine. Freed from wax, the adult female is convex, derm light brown; caudal horn very short, dark brown in colour. There are no distinct tubercles present, but the dorsum is slightly lobed, being wider posteriorly than anteriorly. Around the ventral margin there is a narrow flange, which is slightly indented at the stigmatal areas. Derm chitinous, semi-transparent. Length 3.25 millim.; width 2.50 millim.; height 2.25 millim. Antennæ small and thin, of six joints, all of which bear hairs. Length .241-.252 millim. Length of joints in  $\mu$ : (1) 42, (2) 35-42, (3) 84-98, (4) 17-21, (5) 21-24, (6) 28-35. Approximate formula: 3 (1 2 6) (5 4). Rostrum well developed. Rostral loop short. Legs weak. Length of joints of first pair of legs in  $\mu$ : coxa 77, trochanter and femur 126, tibia 77, tarsus and claw 23. Claw small. Tarsal digitules fine, with slightly expanded ends; those of the claw larger, of unequal size, one being very large, with ends widely expanded. Lateral margin notched at the spiracles; each notch with a circular area of 75-85 large and small blunt spines. Dorsal surface studded with fine gland-hairs.

Male scales very light yellow, elliptical; dorsum convex, ends rounded; lateral margin with a slight fringe of bits of wax. Length 1.25 millim.; width .75 millim. Usually placed on the undersides of the leaves.

*Hab.* Botucatú and Campinas, State of S. Paulo. On a forest tree belonging to the family Myrtaceæ, and on cultivated guava (*Psidium* sp.). The female scales are found on the twigs, and on the midribs on the underside of the leaves, while the male scales are found scattered over the entire under surface of the leaves. The leaves and the scales themselves are usually thickly covered with a black fungus, so that it is nearly impossible to find well-preserved old specimens. A species of ant also accompanies this insect.

*Ceroplastes bicolor*, sp. n.

Adult female scale subcircular; general colour light greenish yellow, sides light reddish brown. Wax hard, surface roughened, the divisions into plates indicated by fine lines. Dorsum flat, greatly depressed about the dorsal nucleus, giving the scale a crater-like appearance. Lateral abdominal margins contracted, light reddish brown in colour, with two fine white lines on each side. Dorsal nucleus large, sub-quadrangle, light orange in colour. The posterior edge of the scale is slightly notched. Size about 4 millim. in diameter. The individuals vary—sometimes the transverse diameter being the greater, sometimes the longitudinal diameter. Height 2–2·25 millim.

Boiled in a solution of KOH, it gives to the liquid the colour of port wine. Denuded of wax, light brown in colour; caudal horn very short, black. Derm neither hard nor thick. Outline slightly angular, dorsum convex, with no distinct humps; lateral margins slightly notched at the stigmatal areas. Length 3 millim.; height 2 millim.; width 2·5 millim. Antennæ small, of six joints, all of which bear hairs. Length ·210–·219 millim. Length of joints in  $\mu$ : (1) 28, (2) 33–36, (3) 61–83, (4) 19–22, (5) 22–25, (6) 31–33. Approximate formula: 3 2 6 1 (5 4). Rostrum well developed. Rostral loop extending to the second pair of legs. Legs very small and weak. Length of joints of first pair of legs in  $\mu$ : coxa 63, femur and trochanter 84, tibia 77, tarsus and claw 63. Digitules of tarsus long, with ends expanded; those of the claw larger, of unequal size, with ends expanded. Lateral margin slightly notched at the spiracles; each notch bears a circular area of about 90 large and small blunt spines.

Male scales small, reddish brown in colour, elliptical with the ends rounded, and the dorsum convex. Length 1·25 millim.; width ·60 millim.

Adult male small, dark brown in colour; antennæ and legs yellowish brown. Total length, including genital spike, ·825 millim.; genital spike ·175 millim. Extent of wings

3.84 millim. Halteres are not present, and the wings do not contain the pockets to receive the hooked ends. Antennæ apparently of nine joints, all bearing hairs; the last ending in three capitate hairs. Legs long and hairy. Claw large. The two pairs of digitules hair-like, with buttoned ends; not much longer than claw.

*Hab.* Campinas, State of S. Paulo, on an unidentified forest tree. The female scales are found on the twigs and branches, and the male scales on the upperside of the leaves. The insects and leaves become covered with a black fungus. A species of *Camponotus* also accompanies this insect.

Campinas, State of S. Paulo, Brazil,  
July 22, 1901.

# XLIX.—*Mysis relicta*, Lovén, in Ireland.

By WM. F. DE VISMES KANE, M.A.

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*Mysis relicta*, Lovén, which inhabits fresh water, differs but slightly from *M. oculata*, Fabr., an arctic marine species, except in its smaller size. According to Drs. Samter and Weltner, the latter has been taken in the sea off Grinnel-land, Greenland, Sabine Island, Iceland, Jan Meyen, Spitzbergen,



Barent's Sea, Novaia Zemlya, Kara Sea, Finmarken, Klostereld Fiord (*Norman*), North Sea, Labrador, and the Atlantic coasts of North America, at depths varying from  $2\frac{1}{2}$  to  $23\frac{1}{2}$  fathoms, but is absent from the Danish waters and the Ost See. Czerniavski also mentions its having been dredged in the White Sea on a muddy bottom at a depth of  $6\frac{1}{2}$  fathoms. *Mysis relicta*, the freshwater species, the subject of this paper, has a very remarkable distribution. It would seem that its first discoverer was William Thompson, of Belfast, who in his 'Natural History of Ireland,' published 1856, mentions that on July 12th, 1851, he examined the contents of the stomach of a Pollan (*Coregonus pollan*, Thompson) taken in Lough Neagh, Ireland, which "proved to be wholly of the genus *Mysis* (not less than 100), except a *Limneus pereger*." Unfortunately he did not enquire further into the species, and made no further reference to it. Just ten years later, in 1861, Professor Lovén published a paper on the Crustacea of Lakes Vettern and Venern, in Sweden, and announced the discovery of the following, namely: *Mysis relicta*, *Idothea entomon*, Linn., *Pontoporeia affinis*, Lindström, *Gammarus loricatus*, Sabine, and *Gammarus cancelloides*, Gerstfeldt; all of which were closely allied to, if not identical with, marine forms. In 1867 G. O. Sars announced its discovery in Lake Mjösen, in Norway also, and eight other Swedish lakes in addition to Lakes Vettern and Venern. Subsequently various lakes in Russia and Finland were added to the list of European habitats. Sars also records its having been taken in the brackish water of the northern part of the Gulf of Bothnia, but not south of Quarken. In North America, Drs. Hoy, Stimpson, and Smith found it in Lakes Michigan and Superior, between which and the sea there is no evidence of any connexion in recent geological times. Lake Ontario, however (from which *M. relicta* appears now absent), evidently formed once a part of the St. Lawrence Valley, and marine shells of the Quaternary deposit have been found there as far up as Kingston; so that it has been suggested that the river flowing out of Lake Superior might have anciently afforded an access for marine species thence.

So far as to the published distribution of the species up to the present date. I have now to place on record further information as to its occurrence in Ireland, which marks at present the most southern range of its extension. In the autumn of 1898 the Rev. Canon Norman showed me a single specimen procured from Lough Neagh, which stands recorded in his monograph on British Mysidæ. The history of the discovery is as follows. Not having been aware of Thomp-

son's reference to a freshwater *Mysis* in Lough Neagh, in 1883 Dr. Norman spent some weeks in the investigation of the Crustacean fauna of several Scottish Lakes, in hopes of finding some of the marine forms taken by Lovén in Lakes Vettern and Venern. Loch Lomond and Loch Ness were first chosen for examination, as being the most likely waters for their occurrence; but though several days were spent, neither dredge nor tow-net yielded the desired results. Loch Leven, Loch Katrine, and many others were also explored on that occasion. He then thought of the great lake in the north of Ireland, and interested the late Rev. J. Gordon Holmes, of Antrim, in the research. Boats and men were then employed under the latter's superintendence in Lough Neagh for a week at the beginning of September 1885, and a series of dredgings were carried out extending over the N.E. quarter of the lake as far south as Ram's Island. The deepest sounding from which mud was collected was 55 feet, about 4 miles off shore. Large quantities of material were then forwarded to Canon Norman, and among masses of various species of Crustacea the specimen of *Mysis relicta* above referred to was detected. I am of opinion that the marine dredge used was unsuited for the capture of *Mysis*, as undoubtedly it is as plentiful in the northern half of Lough Neagh as in the southern, it having been taken there latterly by Dr. Scharff and Mr. Welch, of Belfast; and for the same reason I am not inclined to accept the negative evidence presented by Dr. Norman's examination of the Scottish lakes, in spite of his well-known experience and skill, as conclusively final. Lough Neagh is not only the largest lake in Ireland, but far the largest of any in the British Islands. It is almost rectangular in shape, and averages in length about 16 miles from north to south and in breadth about 10 miles from east to west. Summer level 48 feet above the sea at low water. For its extent it is extremely shallow, the greater area averaging about 40 feet, but it deepens about the N.W. corner towards Toome, where there is a hole with soundings of 96 feet near Pullan Bay. This contrasts remarkably with the depths of 480 to 600 feet to be found in the Scottish lakes. In 1898 Canon Norman urged me to make further researches in Lough Neagh, and accordingly the following July I spent four days at Lurgan, and dredged various parts of the southern half as well as the stormy weather would permit. I had come to the conclusion that a special apparatus would be desirable, and accordingly designed one provided with runners, to prevent it sinking in the muddy ooze which forms a great portion of the floor of freshwater lakes. On the 25th July therefore I crossed from

Kinnigo Gut to Ardboe Point (about 12 miles) on the western shore. With about 1 mile of offing in 40 to 50 feet of water and a muddy bottom I made a haul, and took several *Mysis relicta* and numerous Entomostraca, the new dredge working admirably. Again, when about halfway home, another haul in 35 feet and similar bottom resulted in a further capture of *Mysis*. On the following day I sailed north and dredged in 39 feet soundings about 1 mile west of a line drawn between Ram's Island and Langford Point, and drifted east, the bottom being muddy, and took a great quantity of *Mysis* and a few Entomostraca &c. Another haul was then made in 45 feet and similar ground, with Langford Point abeam about 2 miles off. An immense number of *Mysis* were captured. Another haul in shallower water nearer land and similar bottom was equally successful. Off Tolans Point, on a sandy bottom and shallower water, *Argulus foliaceus* and various Entomostraca were taken, but no *Mysis*. The third day's explorations were chiefly directed to research for Entomostraca along the south shore of the lake as far as the Upper Bann River. Here, with 2 miles of an offing in 20 feet of water, the bottom proved hard and sandy, and two trials for *Mysis* proved fruitless. The fourth day was devoted exclusively to Entomostraca, and no dredging was done. I may here state that the plankton did not offer any evidence of Scandinavian origin, such as I subsequently detected in the Lough Erne Entomostracous fauna. Consequent upon my success in Lough Neagh, I determined to follow up the quest of *Mysis relicta* in Lough Erne, and accordingly on the 30th November following I dredged in the head waters of the upper lake between Belleisle and Knockninny. This part is uniformly shallow, and the bottom wherever tested (except quite along the shore) of a soft ooze. Here also I succeeded in getting numerous examples of this *Mysis* in depths varying from 10 to 20 feet, the females generally being provided with ovigerous sacs, as I had hoped at that season, and were of a greater average size than those captured in July in Lough Neagh. But in addition to this I had the satisfaction of meeting with two species of Entomostraca which have not so far been recorded from British waters, and which constitute further links in the chain of evidence connecting the freshwater fauna of Ireland with that of Scandinavia, namely *Bythotrephes Cederstromii*, Schoedler, var. *Cederstromii* (species stricta), and *Bosmina mixta*, Lillj., var. *humilis*. My friend Canon Norman kindly identified them, and I give the names which correspond to the forms delineated in Prof. Lilljeborg's new

work 'Cladocera Suecica' (cf. p. 226 and plates), who also has been kind enough to examine specimens for me.

Further investigation in the year 1900 showed that in Lower Lough Erne also *Mysis relicta* exists in great numbers, every haul of the dredge producing a plentiful supply both in the shallower waters near the shore and in soundings from 100 to 180 feet in the middle of the broadest part of the lake, here about 5 miles across. Gatherings made about the 1st of June revealed the fact that the greater part of those taken were young individuals of about 9 millim. in length, mixed with a small proportion of adult specimens of full size, namely about 22 millim., which is the same as that of the females with ovigerous sacs taken in the Upper Lake in November; and therefore this may be taken as the average extreme length attained by adults in Lough Erne. An examination of these revealed very slight variation from the continental forms figured by Sars. To indicate the importance of a careful comparison of Irish with continental examples it is necessary to recapitulate the points of divergence between *Mysis relicta* and *Mysis oculata*. The theory put forward by Lovén and generally adopted in reference to the five freshwater Crustacea above referred to, which are only distinguished from their marine congeners by very trivial distinctions, is that the large lakes in which they are found were in late geological times beneath the sea-level, but by the elevation of the sea-bottom were converted into basins whose large extent ensured a very slow alteration of their contents by a very gradual reduction of their salinity. Those Crustacea which have survived proved able to accustom themselves to the gradual disappearance of the saline constituents of their habitat. And in process of time they appear to have developed the slight alterations which now distinguish them from the marine type, partly influenced perhaps by the altered medium and possibly in some respects by isolation. The chief differentiating characters between *Mysis relicta* and the larger *Mysis oculata* as given by Czerniavski and others may be stated as follows:—The flat appendix or scale of the second pair of antennæ in *M. relicta* exceeds by only one third the peduncle of the first pair, being proportionally shorter and broader than that of *M. oculata*. The armature of the mandibles is more complicated. The segments of the first pair of maxillipeds are shorter. The tarsi of the thoracic feet comprise only from six to eight segments, not nine as in the adult *M. oculata* (according to Kröyer). The third and fourth pair of the pleopods of the male, though agreeing in



general structure with those of the adult male of *M. oculata*, correspond more closely with those of its immature form. But the most salient differential character is that of the incision or indent at the distal extremity of the telson, the contour of which Sars points out as also indicative of a slightly arrested development in *M. relictæ*, since it accords closely with the shape of the younger specimens of the marine species. This character, though persistent in the freshwater species wherever taken (since Kessler's illustration from Lake Onega specimens appears only to be diagrammatic), presents some shades of variation. Czerniavski describes the Russian form thus, which accords well with Sars's plates of Scandinavian specimens:—"Telsonte utrimque spinis modo 17-19 armato, incisura postica duplo brevior et lata, marginibus modo leviter convexus." But he mentions that it varies somewhat, and gives two varieties—forma *major*, Sars, from Lake Ladoga, and forma *orientalis*, from Lakes Onega, Putko, and Keno. The latter is considerably the largest race of *M. relictæ* known, being from 18·3 to 21 millim. in body length and 22·5 to 25 millim. over all, measured from the end of the telson and uropods to the extremity of the second antennal laminae. Among other differential characters he points out that in var. *major* the telson is armed with twenty spines and its feet are slender &c., with the extremity of the tarsus much shorter proportionally than that of var. *orientalis*, whose feet are proportionally more robust. Drs. Samter and Weltner, in a recently published paper, describe another form of *M. relictæ* taken by them in the Madü Lake, Pomerania, which is only from 11 to 14 millim. in length as compared with those of Lovén and Sars, *i. e.* 20 and 18 millim. respectively. This form, though small, is stated to be in some respects nearer to *M. oculata* than the typical *M. relictæ* of Lovén, as regards the cephalothorax and eye, and in the male the secondary antennæ and the third and fourth pair of pleopods.

Irish specimens present, so far as I am able to judge, no differential characters from the type of any great importance. Adult examples from Lough Erne, taken on the 30th November, measured  $16\frac{1}{2}$  millim. in body length and 22 millim. over all from the extremity of the antennal scale to the end of the telson and uropods\*. The telson of all the specimens examined was armed with twenty-two spines counting the terminal ones, thus differing from those of Czerniavski, and

\* These were preserved in water and formaline, whereas the quoted measurements of continental examples (if from spirit) would show divergence through shrinkage of the soft parts.

the tarsi of the thoracic feet were composed of from seven to eight segments. The contour of the indent of the telson corresponds very nearly with the figure given by Sars, the convexity at the base of the terminal spines being very moderate.

If the generally accepted theory is correct, namely, that *Mysis oculata* was introduced into freshwater lakes by the Glacial sea when subsidence of portions of the present land-surface took place, no difficulty arises as to its introduction thus into Lough Neagh, for geologists agree as to the submergence of a part of the east of Ireland as well as the central plain. A subsidence of only about 10 feet now would bring the floor of the greater portion of that lake to the level of the sea. But with regard to Lough Erne there is some room for doubt whether the introduction can have taken place from the Atlantic seaboard, because although its proximity would suggest that to be probable, and its present surface-level is only about 130 feet above the sea at high-water spring-tides, while a considerable area gives soundings of between 100 to 200 feet in depth, one spot reaching about 220 feet, yet geological maps do not give the Glacial sea of Pleistocene times such a western extension, the western seaboard of Ireland being supposed by many authorities to have been tilted up, except where the central plain reaches Galway Bay. But since the large basin occupied by Lough Oughter in Co. Cavan, now about 250 feet above sea-level, is included in the eastern area referred to which was submerged, it is very probable that marine organisms would have found their way thereto, as in the case of Lough Neagh. With an elevation of the west coast the drainage of the Erne district would have then flowed easterly; but when the land-surface attained its present relative level, and the transgression of the sea over the eastern area ceased to exist, and the watershed became changed, the drainage of Lough Oughter flowed westward into Upper Lough Erne as at present, and such marine organisms as survived would have had an opportunity of colonizing its waters.

I hope at an early date to explore a portion of Lough Oughter with the object of finding *Mysis relicta*. I desire to express my obligations to the Rev. Canon Norman for access to his valuable library and other assistance.

Drumreask House, Monaghan.

L.—*Some Experiments in Seasonal Dimorphism.*

By GUY A. K. MARSHALL, F.Z.S.

ALTHOUGH a considerable number of important experiments to test the direct effects of temperature and humidity upon the coloration of butterflies have been carried out by several distinguished observers in Europe, yet the question appears to have received but little attention in those parts of the tropics where the extreme difference in the seasons has resulted in many striking cases of seasonal dimorphism. Possibly other experiments in this direction have been placed on record, but the only one which has come under my notice is that of Doherty with *Melanitis leda*, where he succeeded in producing the wet-season form during the dry season by keeping the larvæ and pupæ in a bottle containing a wet sponge. The paucity of such records has led me to publish the results of a short series of experiments made during the past winter with a view to ascertaining how far humidity alone, as apart from heat, can be held responsible for the marked differences between the summer (wet) and winter (dry) broods of many of our butterflies.

The species used in these experiments belong mostly to the genus *Terias*, the reason for this being, partly, that the larvæ and their food-plants were more accessible than those of most other suitable genera, but principally owing to my surmise that a species which exhibits a gradual and continuous transition from the summer to the winter form would probably respond more readily to the direct action of climatic conditions than would one in which the intermediate forms have been more or less largely eliminated by natural selection, and which thus might have acquired through this principle a definite alternation of generations, irrespective of external stimuli, as first suggested by Weismann. The truth or otherwise of this supposition has yet to be demonstrated, though the results here set forth do not appear to lend it any support.

The experiments fall into two groups. In the first series the larvæ were reared under normal room conditions, and were not transferred into damp surroundings until they had suspended, the only exceptions being two examples of *Terias senegalensis* which had pupated in the room before being submitted to moisture. In the second series the period of humid conditions was much lengthened, the larvæ being kept in the damp tins for from five to thirty-six days before pupation, in case this might prove to be the more sensitive stage. The necessary conditions were obtained by using a number

of tightly closing tins, which were half filled with moist earth or sand, this being kept sufficiently wet to ensure the proper saturation of the air. In all cases the pupæ were not removed until the pigments could be clearly seen under the wing-covers. Although the tins were opened several times a day for the purpose of ventilation, it was impossible to entirely prevent the growth of mould, which did a considerable amount of damage, and the saturated atmosphere was evidently prejudicial to the health of the insects. It was noticeable that the mould did not affect healthy pupæ which were normally suspended; but in many cases the fastenings of the larva were dissolved by the moisture, and it would fall on the wet earth just before or after pupation. The slight injuries thus sustained proved fatal in every instance.

The full results obtained may best be shown in tabular form (pp. 400-401).

From these tables it will be seen that out of thirty-three imagos no less than thirty remained unaltered by their abnormal treatment and developed the ordinary coloration characteristic of the dry season. With regard to the three exceptions, it cannot be supposed that their divergence was due to the direct action of the moisture, owing to the overwhelming counter evidence, and they must be regarded simply as instances of that overlapping tendency which is so abundantly evident under natural conditions and of which it is difficult at present to offer any adequate explanation. In the case of the two *Terias Desjardinsi* in the second series, I made a check observation in the field at the time of their emergence by examining fifty specimens of *Terias* captured at random, only taking into consideration those which were in good condition and had probably lately emerged. Of these I found six showing marked variations in the direction of their respective summer forms, or a total of 12 per cent. In my experiments, out of twenty-four *Terias* only two showed such variation, giving a percentage of 8.3. We may thus broadly consider that the artificial conditions to which they were subjected had no effect whatever upon these insects and that their behaviour was practically identical with what it would have been in their natural mode of life. This result is certainly at variance with my own anticipations (at least so far as the genus *Terias* is concerned) and is in direct opposition to Doherty's conclusions.

It cannot, however, be legitimately concluded from these experiments that humidity plays no part in the causation of seasonal dimorphism, for field observations have convinced me that the lateness of the summer rains will certainly retard the



## SERIES I.

Species.	Placed in damp.	Pupated.	Removed.	Emerged.	Result.
<i>Terius senegalensis</i> . . . .	April 9.	April 9.	April 17.	April 21.	♂ dry.
" " . . . .	" 14.	" 13.	" 23.	" 27.	♂ dry.
" " . . . .	" 15.	" 17.	" . . . .	" . . . . .	Ichneumoned.
" " . . . .	" 22.	" 23.	May 4.	May 8.	♀ dry.
" " . . . .	" 24.	" 26.	" . . . .	" . . . . .	Killed by mould.
" " . . . .	" 26.	" 27.	May 8.	May 12.	♀ dry.
" " . . . .	May 4.	May 3.	" 17.	" 24.	♀ dry.
" " . . . .	" 4.	" 8.	" 16.	" 20.	♀ dry.
" " . . . .	April 9.	April 10.	" . . . .	" . . . . .	Died.
<i>Desjardinsi</i> . . . .	" 21.	" 22.	" . . . .	" . . . . .	Pupa killed by ants.
" " . . . .	" 21.	" 23.	May 4.	May 10.	♂ dry.
" " . . . .	" 21.	" 22.	" 4.	" 10.	♂ dry.
" " . . . .	" 21.	" 23.	" . . . .	" . . . . .	Killed by mould.
" <i>brigitta</i> . . . . .	" 11.	" 12.	" . . . .	" . . . . .	Ichneumoned.
" " . . . . .	" 22.	" 23.	" . . . .	" . . . . .	Killed by mould.
" " . . . . .	" 24.	" 26.	" . . . .	" . . . . .	Ichneumoned.
<i>Precis archesia</i> . . . . .	" 16.	" 17.	May 8.	May 15.	Killed by mould.
" " . . . . .	" 21.	" 21.	" 6.	" 8.	♀ dry.
" " . . . . .	" 28.	" 30.	Not removed.	" 11.	♂ dry.
" " . . . . .	" 5.	May 6.	May 17.	" 21.	Dry form, badly deformed.
<i>Byblia acheloia</i> . . . . .	April 22.	April 23.	" 28.	" 30.	♂ dry, var. <i>Staudingeri</i> , Dew.
" " . . . . .	May 1.	May 1.	" 22.	" 12.	♀ dry.
" " . . . . .	" 5.	" 6.	" . . . .	" 23.	♂ dry.
" <i>ilithia</i> . . . . .	" 7.	" 7.	May 29.	" . . . . .	Died.
" " . . . . .	" 11.	" 12.	June 4.	May 30.	♂, almost full wet-season form.
" " . . . . .	" . . . .	" . . . .	" . . . .	June 7.	♂ dry, deformed.

## SERIES II.

Species.	Placed in damp.	Pupated.	Removed.	Emerged.	Result.
<i>Byblia ithyia</i> .....	April 28.	May 13.	....	.....	Died.
" .....	" 28.	" 14.	....	.....	Died.
" <i>achelonia</i> .....	" 28.	" 31.	....	.....	Died.
<i>Teracolus omphale</i> ....	May 5.	" 16.	June 7.	.....	Died.
" .....	" 5.	" 30.	" 7.	.....	Died.
" <i>phlegyas</i> .....	" 5.	" 15.	....	.....	Failed to emerge.
<i>Terias senegalensis</i> ....	April 25.	" 4.	May 20.	May 24.	♀ dry.
" .....	" 25.	" 5.	" 20.	" 26.	♂ dry.
" .....	" 25.	" 10.	" 27.	June 1.	♂ dry, badly deformed.
" .....	" 25.	" 12.	" 29.	" 2.	♀ dry, badly deformed.
" .....	" 25.	" 12.	" 29.	Failed to emerge.	♂ dry.
" .....	" 25.	" 12.	....	.....	Died.
" .....	" 25.	" 12.	Not removed.	June 3.	♀ dry.
" .....	" 25.	" 14.	June 3.	" 11.	♀ dry.
" .....	" 25.	" 20.	" 15.	Failed to emerge.	Dry form.
" .....	" 25.	" 25.	" 15.	" "	Dry form.
" .....	" 25.	" 27.	" 15.	" "	Dry form.
" .....	" 25.	" 29.	" 15.	" "	Dry form.
" .....	" 25.	June 1.	" 15.	" 8.	♀ dry, badly deformed.
<i>Desjardinsi</i> .....	" 24.	April 29.	May 16.	May 17.	♀ dry.
" .....	" 24.	May 1.	....	.....	Killed by mould.
" .....	" 24.	" 7.	May 22.	May 28.	♀ badly deformed. Almost full dry form, but no trace of subapical dash on underside of fore wing.
" .....	" 24.	" 9.	" 21.	" 28.	Small ♂ with wet underside, but black borders above about intermediate in width.

appearance of the wet-season forms. One of the most marked cases was in the summer of 1895-96, when I was camped at Gadzima, on the Umfuli River. In a normal season we usually get a few preliminary thunderstorms or showers in September, and always in October, and the first appearance of the wet-season broods may be looked for in the latter half of November. But in this case not a drop of rain fell in that locality until the 10th November, and even then there were only a few scattered showers during that month. When I left the district on the 1st January the dry-season forms of the Pieridæ were still on the wing in full force, and I had seen no sign of the wet forms of the three common species of *Pieris*, or of the *Teracoli* except one wet-season male of *T. pallene* and one intermediate form of *T. Annæ*. The *Terias*, however, were peculiar, for while in the case of *T. brigitta* the winter form alone was on the wing at that date, the summer form of *T. senegalensis* appeared first on the 17th November and increased in numbers thereafter. This abnormal lateness of the wet-season broods could only be ascribed to the equally abnormal rainfall (it was under 14 inches for the whole season), and at the same time it showed that heat alone is not the exciting cause which induces the appearance of the summer form, for the dryness in the early summer caused, as usual, a marked increase in the heat, so that the summer forms should have appeared earlier than usual instead of later had been the controlling factor.

On the other hand, in the case of *Precis sesamæ* I have noticed that the typical dry-season brood has appeared very regularly in the past four years during February, or even in the end of January, under the most contrary conditions, which leads to the inevitable conclusion that its emergence is regulated by some factor other than mere climatic conditions. Indeed, the behaviour of this species tends to strengthen a suggestion which I have already advanced, namely, that possibly we have here a case in which the dry form is gradually tending to eliminate and supplant the less adaptive wet form, as a result of natural selection. And the evidence is even stronger in the case of *P. artaxia*, Hew. During the same seasons, however, the winter forms of the less differentiated Pieridæ made their appearance, as usual, at the end of the rains.

The fact that one of the *Precis archesia* in the first series of experiments emerged as the var. *Staudingeri*, Dew., in which the marbled markings on the underside are absent, is of special interest, for although I have had a fairly wide experience of the species in this country, I have never yet

seen this variety in the field, its normal habitat lying considerably north of this locality. It would, however, be dangerous to base any conclusions upon an isolated case of this kind.

From the foregoing facts it seems probable that, in the case of those species which are amenable to the influences of climate, the stimulus necessary to induce seasonal change would consist in a combination of either moisture and heat or dryness and cold, and not in either of these factors exclusively.

Two years ago I made a few experiments in applying moist heat to the pupæ of several species of *Teracolus*. Unfortunately all my notes on the subject have been lost, but, so far as I can recollect, the results were almost entirely negative, which I then attributed to insufficient heat. The resulting specimens were, however, sent to the Oxford University Museum with full data, and such of the insects as are worth preserving from the present experiments are being sent to the same institution.

Salisbury, Mashonaland,  
August 1901.

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LI.—*A Revision of the Genera of the ARANÆÆ or Spiders with reference to their Type Species.* By F. O. PICKARD  
CAMBRIDGE, B.A.

IN the 'Annals & Magazine of Natural History' for January 1901 I have discussed the question of the determination of type species for various genera and have briefly detailed the main features of that method of selecting type species amongst *heterotypical* genera which is usually known as "*elimination*" or "*exhaustion*."

My remarks have called forth prompt criticism from Dr. Dahl, in a paper published in the 'Archiv für Naturgeschichte,' Jahrg. 1901, under the title "Die internationalen Nomenclaturregeln und ihre Anwendung auf die ältesten Spinnengattungen."

In this paper the author questions not only the application of the principles laid down in relation to the special cases dealt with, and the value of the methods themselves, but he even goes so far as to doubt whether there is any necessity for the selection of a type species at all.

Now, before we enter the field of discussion as to the methods and rules whereby a type species is to be recognized,



we must be quite certain that we have made up our minds first of all as to whether, in the interests of practical systematic zoology, a type species is to be selected or not.

It is still an open question for some. The general morphologist, for instance, who is under the impression that a thorough knowledge of the anatomy of the common stag-beetle sufficiently warrants him in speaking authoritatively on leading questions involving the whole family of the Coleoptera, may perhaps not appreciate the necessity; but the systematist who has to deal with countless generic divisions, subdivisions, and names, and to determine what characters those names are to connote and what species to denote, who is familiar with the hopeless chaos arising because no two authors agree on those points, and who wishes to see some definite settlement of them, this man will not hesitate as to the course to be adopted. And although Dr. Dahl gaily enters the lists in this criticism of methods, he has evidently not made up his own mind as to whether it is necessary to select a type species or not; for he says, "*I think we are acting in perfect accordance with the spirit of the rules of nomenclature if we . . . in certain circumstances even acknowledge several typical species for one genus.*"

Well, Dr. Dahl is of course perfectly entitled to his own opinion on the matter; but one wonders how came *he* into this galley at all? If he does not acknowledge the necessity of selecting a type species for a genus, he has evidently had no great practical acquaintance with modern systematic zoology—not sufficient, at any rate, to justify him in a wholesale criticism of the comparative merits of the various methods of selecting types.

If Dr. Dahl's attitude be really, as he suggests, in accordance with the spirit of the "Rules of Nomenclature"—a spirit which allows him to select a single type in one case and three or four in another,—well, then, so much the worse for those rules, and the sooner they adapt themselves to the needs of systematic zoology the better will it be for those who are practically engaged therein.

In criticizing the methods followed in my paper Dr. Dahl declares that "*the writer follows his own rules of nomenclature.*" I must say I am surprised that Dr. Dahl should be so very ill-acquainted with the whole problem of the selection of types as to credit me with the invention of methods which have been well known for years to the majority of the ablest systematists of the day in most branches of zoology.

He, moreover, states that those methods are contrary to the spirit and letter of the International Rules of Nomenclature.

As a matter of fact, the adoption of the method of "*elimination*" is simply the logical application of the very rule which Dr. Dahl himself quotes as follows :—" *The first publication in which a genus is subdivided, whether justifiably or unjustifiably, whether in a conscious or an unconscious manner, must, where no typical form was named, decide what portion of the original genus is to retain the original name.*"

If the first publication leaves more than one species in the genus, then the next publication which again subdivides the residue will decide what portion of the original genus is to retain the original name, and so on until one species only is left, and this remains as the type. And if not, why not? And if so, this is just simply the process of "*elimination*" or "*exhaustion*."

If the International Rules allow an author to limit a genus to ten species, on what logical grounds will they forbid him from limiting it to ONE species? And if an author definitely selects (or cites) a single species as the type, he is simply, "*justifiably or unjustifiably, consciously or unconsciously,*" deciding what portion of the original genus (a single species in this case) shall retain the original name. The process is not precisely similar to that of elimination, but for all practical purposes it is the same.

### *Elimination pure and simple.*

Now elimination pure and simple proves in its practical application almost invariably to land us in an absurdity. In this way: the species which authors withdraw are usually those that are best known, with characters salient and well described, leaving in those less well known—with this result, that the last species left in is one which is not known, is badly described, and is never likely to be identified with any certainty; and this miserable phantom is left us as the type of the genus. In its simplest and purest form the process often ends in a futility.

But by recognizing the *definite selection or citation* of a type species systematists may overcome this difficulty, and by a process not inconsistent with the Rules of International Nomenclature. Because, it will be noted, most authors in citing a type species have selected as typical those that are well known to them, and hence the genus will be represented by a species whose characters can be always ascertained; so that for "*practical purposes,*" and we are now concerned with none other, the process or method which most of all serves in bringing about a reasonable and practical result is one of

*elimination tempered by definite selection or citation*—the one object held in view being the narrowing, as early as possible in the history of a genus, the area within which the type species must be sought for, always presuming that this shall be one of those species originally included when the genus was first founded and the generic name bestowed.

*The Problem before us.*

We must, then, in connexion with this problem make up our minds on the following points:—

A. As to the date from which our nomenclature is to begin.

B. As to the necessity for fixing upon a single species as the type of each genus.

C. As to the method of fixing upon a single species as the type in the case of heterotypical genera.

With regard to the first point: in my paper referred to above I had not excluded the names published by Clerck in 1757, because I considered that they answered all the requirements of the binomial system. It is of course quite absurd to exclude Clerck merely because he wrote one year earlier than the date arbitrarily fixed upon as the point whence our nomenclature should start—the tenth edition of Linnæus, 1758.

None the less, however, I agree with Dahl that if we are to accept the tenth edition as the starting-point, then Clerck's names must go; for this is just a case in point where we shall never get agreement unless we adhere absolutely to this first rule. There is no question of right or wrong in the matter, nor even of common sense—rather the contrary; it is simply a question of convenience, a step taken for "*purely practical purposes*," as Dr. Dahl himself suggests, in order to avoid disputation and to bring arachnological nomenclature into line with that of other branches of zoology.

B.—It is not necessary to enlarge upon the necessity of fixing upon a single species as the type. This, again, is a purely practical question, for theoretically there is no type of a genus. And this practical type is a species, in the case of arachnology consisting of two sexes, round which others group themselves, their characters fining away all round the circumference, where they pass into other adjacent groups. Practically we have to decide upon the species which is to be regarded as the centre of this group.

Dr. Dahl, in pointing out that the International Rules make no mention of the right of an author to select a type, adds that "*they speak only of the original type, and in this they do*

well." He admits, then, that the *original type* (not several types) is to be sought for under the International Rules; but that is precisely the problem before us, to settle what is to be considered as this original type.

Dahl would have us analyze and weigh every word of an author, in order that we may glean, if possible, some inkling as to what species he would seem to have had more especially in his mind when he founded a genus, so that we might select that species which appeared to embody more fully the characters of the genus according to the author's original idea.

Theoretically this course appears reasonable, for practical purposes it is impossible. How many arachnologists would agree, first, as to what the original idea of the genus was, and second, as to which species fulfilled all the requirements of that idea? In this way we launch ourselves at once into that labyrinth of hair-splitting arguments out of which there is afterwards no escape for the disputants and no practical way out for a type. It is exactly this fatal quagmire that we have to avoid if we are ever to come to any agreement at all. There are a quite sufficient number of "*hard cases*" to exercise our analytical faculties over in minor details without rendering the settlement of every case impossible at the outset. But on what practical grounds can Dahl, ostensibly seeking for Latreille's original type of *Salticus*, for instance, refuse to recognize the species which the author himself a few years later cited as "*type*"? Is it likely, without necessarily converting the word type into a fetish, that Latreille would have cited the species which he did *not* regard as fairly embodying his idea of the genus? Is it not more reasonable to suppose the contrary to be the case?

In fact Dahl himself says:—"Since later authors ought as closely as possible to follow the original author, the species specially named by the latter must, by them also, be the first to be considered." Precisely so! And for practical purposes the adoption of the type cited saves us a great deal of unnecessary trouble. Why, then, ignore Latreille's citations in 1810?

But of course every one has a right to his own opinion, and if Dr. Dahl does not agree that it is necessary to select a type species at all, I fully respect his opinion. But it is of no use discussing with him as to the methods to be adopted in the process, when he does not even agree that the process itself is necessary.

C.—On the method of fixing upon a single species as the type in the case of heterotypical genera. There are four methods:—1. Elimination or exhaustion; 2. Restriction;



3. Citation or selection of a type; 4. Selection on account of the identity of generic or specific names. We have to consider under what circumstances a genus can be regarded as legitimately restricted either by elimination, by restriction, or by the citation of a type.

(1) To take the case of *Pure Elimination* first. When a genus is subdivided or broken up by an author and one or more new genera formed out of the original species, leaving one or more species under the original name, this is legitimate elimination. But there is no elimination when the original genus is merely cited and one or more of the original species cited under it. There must be at least *one* new genus founded out of the original species at the time when we claim subdivision or elimination to have taken place.

The reasons for this will be obvious. In the first place, it will confine us to works that are definitely systematic, and not merely *lists*; and, secondly, we shall exclude the works of those who were merely compiling a popular treatise, without any intention of advancing the systematic knowledge of the group—"Ignoramuses," as Dr. Dahl prefers to term them. By adopting this course, too, we shall save ourselves the trouble of undertaking half a century of research in the British Museum, examining every newspaper, periodical, magazine, and popular treatise, lest perchance some author has unwittingly restricted a genus by some unconscious elimination of certain species originally included in it.

(2) Next, to take the case of "*restriction*." When an author definitely states that he wishes it to be understood that a genus be restricted to such and such species, or cites certain species and adds the formula "*sensu restricto*," the conditions under which this restriction takes place are in themselves a sufficient guarantee that the work is *systematic* and not that of an "*Ignoramus*."

(3) With regard to the third method, namely that of the selection or citation of a type, we have to be equally explicit, for purely practical purposes, as to the circumstances under which such action can be regarded as valid. It is not a question as to what early authors meant by the terms "*type*" or "*example*," or what they did not mean; nor is it a question of what we think they meant. They themselves knew, in all probability, exactly what they meant by these terms, though it is quite clear that we ourselves cannot say for certain what they did or did not mean.

But the practical question for us is, what meaning are *we* going to attach to these terms—*typ*, *typus*, *type*, and *exemplum*, *exemple*, *example*? For we must be quite clear in

our own minds on the matter, just as we were on the question of the tenth edition of Linnaeus. It is not a question of right or wrong, nor of common sense; it is purely a question as to what course is for practical purposes the simplest and least likely to lead to disputation.

Personally, and I have no wish to lay down any law for any one, I am inclined to believe that the line should be drawn at "*example*." That we should assume that when an author cites a single species with the additional designation of *typ*, *typus*, or *type*, he was definitely citing what he regarded as the species fairly embodying the characters of the genus, provided, of course, that it was originally included in the genus.

Thorell, as long ago as 1870, recognized the significance of this term and himself selected "*types*"; Simon has also taken the same line; and the only point one would insist upon is that we shall not allow ourselves to open up disputation as to what an author did or did not mean when he used the term. The point is that he has done so in printed fact, and for our present practical purpose that is sufficient.

I would not admit "*example*," because it is more than probable that this word has frequently been used by writers who had no idea of definite systematic study; and if we did so we should instantly open the door for the entrance into the field of enquiry of all those popular and trivial works referred to above, which are well excluded by confining ourselves to those selections cited under the word "*type*."

One does not for a moment suggest that this course has any great underlying principle which would commend it, but that it is the simplest for those whose only object in view is to narrow down as early as possible the area within which the type need be sought for—no unimportant consideration in cases where sixty or seventy species were originally included.

This course will, I have little doubt, be adopted by all authors, as it has been by very many already who have had abundant experience in actually dealing with the complex questions involved, and have ascertained on what lines absurdities can best be avoided and some definite result reached. Men whose knowledge of the subject is purely theoretical will probably not agree on *any* lines that may be suggested, for the simple reason that there is not one of the lines proposed against which one or more weighty objections cannot be urged. This we freely admit, and it is necessary then, if we are determined to arrive at some practical result, to choose that method against which fewest objections can be urged by those who have actually worked out results.

(4) The custom of regarding as the type of a genus that species whose specific name has been adopted as the name of the genus including it has long been followed by zoologists. Examples of such identity of generic and specific names will readily occur—e. g. *Lutra lutra*, *Scomber scomber*, *Astacus astacus*, *Avicularia avicularia*, &c.

The reason for such custom is clear. If a species be definitely referred to by the author in connexion with the formation of a genus, it is assumed that the author himself regarded this as the type. How then, it is argued, can an author refer more pointedly to a species than by adopting its specific name to denote his new genus? This species, then, is regarded as the type and has prior claim as such over any other left by subsequent process of elimination or citation, just as would be the case if the author himself had cited the type at the time of founding the genus.

But in any case the species must have been originally included in the genus, e. g. *Avicularia avicularia* (Linn.). The type, however, of *Tarentula*, Sundevall, cannot be *T. tarentula* (Fabr.), because this species was not originally included amongst those referred to the genus. Fortunately very few cases of such identity of name occur, so that complications are not likely to arise.

### *The oldest Species as the Type.*

There appear to me to be no reasonable grounds for supporting the contention that the oldest species ought to be regarded as the type in heterotypical genera where no type has been previously cited, definitely indicated, or left in by exhaustion.

No one can confidently assert that authors always had the *oldest* species in their minds when they diagnosed their new genera, any more than that they had the *first in order of publication* in their minds. One might equally well assert that the *middle* species of the series would be more especially in the author's mind, and that he was grouping the others round this central typical form. There can be no grounds for either of those assumptions, and no two authors would nowadays agree on any one of them.

It seems to me better to leave the selection in such cases entirely to the option of the selector.

There are several other points also about which we must make up our minds, to which I now briefly refer.

*A Generic "Nomen nudum."*

Much diversity of opinion appears to exist also on this subject, but, none the less, if we are to make any attempt to settle the type species of a genus we shall have to make up our minds under what circumstances a generic name is valid and when a *nomen nudum*.

There are two sets of circumstances under which a generic name might conceivably be regarded as null and void, and one in which it is not easy to decide:—

(1) When a generic name is proposed and published without either generic diagnosis or any species cited by name or cited by reference to some group name or sectional name, involving certain species under them, previously published.

In this case, since there are no means whatever of ascertaining the characters on which the genus is founded, the generic name is null and void.

(2) When a generic name is published with a generic diagnosis, but without any species being cited either by name or by reference.

In this case, again, the type species cannot be fixed, and though the generic characters are given, unless a definite species be cited or referred to, it is difficult to understand how the genus can be valid, seeing that theoretically a genus represents a group of species, and must, for practical purposes at any rate, be represented by at least *one* species definitely cited or referred to. Dr. Dahl would, if further proceedings interest him in any way, agree to this, for in his analysis of the spirit of the Rules of Nomenclature, in his search for the principles on which they are based, he has discovered—PRINCIPLE IV. "*Typical species, in the rules of nomenclature, take the place of the conception of genus*": with this result, that "*the purely formal basis is retained, and the fluctuating conception of genus avoided.*" Quite so! That is precisely what we are striving to point out. Our efforts are directed to secure this "*formal basis*," so as to avoid that "*fluctuating conception of a genus*" which is so exasperating to the modern student of the Araneæ.

(3) The next case is a doubtful one. When the species quoted or referred to actually contradict the generic diagnosis in one or more characters.

This is a difficult question, because at first sight it seems that if a species in any of its characters contradicts the diagnosis it cannot be the type of that genus. But supposing the character is not *essential*—e. g. the central anterior eyes are two and a half diameters apart, whereas the generic



diagnosis quotes them as two diameters apart, while the rest of the characters coincide with the diagnosis. Can one hold that this would exclude the species from being regarded as the type? Who is to settle what is the essential character of a genus and what is not? No two authors would agree. Personally, I should hold that since we are looking for a formal basis, the best one we can find will be one of the species originally referred to the genus, quite irrespective of whether the author described their characters correctly in his generic diagnosis or not. One would not, of course, if the selection of a type were left to one's self, deliberately select the species which was thus contradictory to the generic diagnosis; but otherwise one would have to treat the species as though there was no contradiction. That at least is my personal opinion. The fact is that it is not the generic diagnosis (the conception of the genus) which is all-important, but the species referred to the name; these are all-important, for from one or other of them the characters of the genus can always be ascertained, especially if one be selected as the type. Dr. Dahl will agree with this, being merely the practical application of his Principle IV., though his attitude in other respects is not altogether consistent with his adherence to the principle he himself claims to have discovered.

It follows, then, that there are two circumstances under which a generic name is clearly valid:—

(1) When accompanied by a diagnosis and with one or more species cited by name or clearly included by reference to some former publication.

(2) When not accompanied by a diagnosis, but with one or more species cited by name or included by reference.

*Note.*—The generic diagnosis is really included in the species. In the case of the Araneidea we should be obliged to exclude almost all of C. L. Koch's generic names if the presence of a generic diagnosis were held to be indispensable to an available generic name.

*When a Type Species has been wrongly identified.*

Another case giving rise to much difference of opinion runs as follows:—An author founds a new genus with a diagnosis, and cites as the *type* a single species already described. It is afterwards discovered that the specimen diagnosed is not the species the author supposed; it has been wrongly identified.

The question is, What *now* is the type of the new genus, the species cited by name or the specimen which has been wrongly identified?

To give a concrete case in illustration. The new genus

*Melopæus*, accompanied by a diagnosis, was based on a specimen in the Brit. Mus. Coll. identified by the author as *Selenocosmia albostrata*, which is cited as the type.

Now if *S. albostrata* has in this instance been wrongly identified, what is to be regarded as the type of *Melopæus*?

Some authors consider that the species cited by name must be the type, and the name *Melopæus* will become a synonym of *Selenocosmia*, or, at any rate, will follow the fortunes of *S. albostrata*.

Others regard this as absurd, a mere confounding the symbol with the thing signified, and hold that the specimen, though wrongly identified, is, and always must be, the type of *Melopæus*.

Now there are two possible circumstances—

(1) In which the specimen, wrongly identified, has never been described and has no name.

In this case *Melopæus* becomes a generic "*nomen nudum*," because, though the genus is diagnosed, it is based upon a non-existent species, and therefore there can be no *type species* of the genus.

(2) In which the example, wrongly identified, is found to have already been described under another name.

Then this species thus named is the type of *Melopæus*, and the name *Melopæus* will follow the fortunes of the type species.

There is no doubt that *Melopæus* must, for weal or woe, follow the fortunes of the specimen whence the diagnosis is drawn. If the latter be non-existent as a recognized species, *Melopæus* falls; if the specimen diagnosed be referable to another genus under a recognized specific name, *Melopæus* becomes a synonym under that genus.

It is, however, of course open to the author to describe the example, using if he please the original generic name; but if another author has meanwhile described the species under another new generic name, then *Melopæus* becomes its synonym.

This at least, in my humble opinion, is the solution of the case in question.

### *Priority in Pagination.*

Every one will agree with Dr. Dahl that there is no necessity to point out that the first pages of a work cannot be considered in reference to their date of publication as older than the later pages.

The choice of a name, specific or generic, which occurs on

an earlier page in preference to one printed on a later page, or a later line on the same page, can be defended simply on the grounds that it is an extremely useful course to adopt for "*practical purposes*." We have to select *one* name, why not select that which occurs first? It occurs first in the manuscript, it was first set up in type, if the question of priority be discussed; but whether or not makes no difference. It is a simple straightforward method of settling a difficulty. But some people do not like simple methods; they prefer to enter into labyrinthine arguments rather than settle the matter. Does it simplify the process of determining which specific name is to hold good out of three, each of which was applied to a variety of the same species, by asking, for instance, under which name the "*forma principalis*" is described? Who will agree as to the "*forma principalis*," when the form which is a variety in one country may be the principal one in another?

Of course, if it be not agreed that we want to reduce these methods to their simplest possible terms, there is no need to waste time discussing the point either on this or any other question.

In conclusion, I regret that pressure of other work has prevented me replying to Dr. Dahl's paper before, and even now hinders me from dealing with the question of the types of the Latreillean genera just at present. This, however, I hope to do shortly, and also from time to time with the others on the lines briefly indicated above. But I should like it to be distinctly understood that I have no wish or intention of laying down the law for any one else on any point; but having come to the conclusion that, if the confusion in the nomenclature of the Arachnida is not to become worse confounded year by year, the types must be selected and some definite conclusion arrived at with regard to them. Practical acquaintance with the difficulty and the intricacy of the questions involved has suggested the remarks made above as to the methods to be followed. These are not my own methods, but have been followed, tentatively at any rate, by many authors for years. I may remark, however, that I have not given adherence to any of them without first applying the test of their practical application to the problem before us. And, finally, I would like to point out again to Dr. Dahl that, far from being contrary to the spirit of "*Die internationalen Nomenclaturregeln*," these methods are quite consistent with both letter and spirit as he himself has quoted and interpreted them respectively.

## LII.—On Okedenia, Eul.

By C. MERESCHKOWSKY.

[Plate VII.]

THE genus *Okedenia* was established in 1868 by Eulenstein in a manuscript which was never published. He founded it for a strange and particular diatom which had been described in the year 1849 by Brébisson under the name of *Amphipectura inflexa*\*; and for some time this genus was accepted by such authorities as Cleve and Van Heurck, who both published among their type species the *Amphipectura inflexa* of Brébisson under the name of *Okedenia inflexa*†. A more careful examination of the structure of the frustule made especially by Van Heurck has convinced this author, Cleve, and, finally, all diatomists that the form was simply an *Amphora*, an opinion which had already been suggested by H. L. Smith in 1873‡. Thus this genus had only a short existence, and was soon discarded, as it seemed, for ever.

In the present note I shall endeavour to restore this old genus and establish it on a new basis. It will, however, comprise not only *Amphora inflexa*, but also another rather curious and strange diatom belonging to the genus *Navicula*. I mean *N. scopulorum*, Bréb., or *N. Johnsonii* (W. Sm.) as some authors prefer to call it. Both are very peculiar forms, not near akin to any other species of the respective genera to which they have been assigned; and this has struck all diatomists who have had to deal with them. Thus, for instance, Cleve calls *Amphora inflexa* an "isolated and strange form"§, and in regard to *Navicula scopulorum* he says that "it is a very characteristic form, which seems not to be very nearly allied to any other species"||; and Van Heurck¶ has even created a special group for this species—the *Johnsoniæ*. As may be seen, the shells alone point to the fact that these diatoms are of a very peculiar nature, distinct from *Navicula* as well as from *Amphora*.

But it is not so much on account of the form and structure

\* Kützing, Spec. Algarum, p. 88.

† Cleve, Mar. D. no. 192; Van Heurck, type no. 167.

‡ 'The Lens' (Chicago), ii. p. 78.

§ Cleve, Synops. of the Navicul. Diat. part ii. p. 131.

|| L. c. part i. p. 152.

¶ Van Heurck, Syn. d. D. d. Belg. p. 99.



of the frustule or the valve as of that of their cell-contents that I find it necessary to separate these forms from their respective genera and to unite them in one new, or, rather, revived genus. The chromatophores of *Amphora inflexa* and *Navicula scopulorum* are, indeed, so peculiar and so different from those of *Navicula* and *Amphora*, that it seems very unnatural to unite them with either of these genera; and at the same time the endochrome is so similar in both that there can be no doubt as to their near relationship.

Besides the two above-mentioned diatoms, I include in the same genus *Okedenia* two new forms which are characterized by their endochrome. The endochrome being thus the main characteristic, as well of the genus as of the species which it includes, I will now proceed to its description.

***Okedenia scopulorum* (Bréb.), Mer.**  
(Pl. VII. figs. 1-3.)

*Navicula scopulorum*, Bréb. in Kütz. Spec. Alg. p. 81; Grunow, Verhandl. 1860, p. 547, pl. iii. fig. 6; Donkin, Brit. Diat. p. 73, pl. xii. fig. 5; Cleve, Syn. Navic. Diat. part i. p. 151; Peragallo, Diat. mar. d. Fr. p. 68, pl. viii. fig. 26. *Pinnularia Johnsonii*, W. Smith, Br. Diat. pl. xix. fig. 179 (1853). *Navicula Johnsonii*, Van Heurck, Syn. D. d. Belg. p. 99, Suppl. B, fig. 28.

The endochrome consists of 16-38 granules or little plates regularly disposed in pairs along both of the connecting-zones. Each plate is composed of two narrow longitudinal bands, occupying respectively the right and left side of the frustule, and connected in the middle by a narrow transverse bar, thus reproducing exactly the letter H. When seen from the valve-face they appear as simple sticks disposed in two rows along both sides of the valve (fig. 1). It is only when the frustule takes an oblique position that both opposite plates with their eight prolongations can be seen simultaneously.

In some cases the transverse band may be broader than is represented in fig. 2; but such cases are not typical. The terminal chromatophores reach the extremities of the frustule, in the middle they are not more distant than elsewhere. The central part of each chromatophore contains a pyrenoid, which has the shape of a flat disk or ellipsoid, appearing more or less rounded when seen from the girdle-face and more elongated elliptic when seen in profile, *i. e.* from the valve-face. When the diatom is dead the H-formed plates become contracted, and they appear then as simple round granules (Pl. VII. fig. 4, and woodcut figs. 1, 2).

This structure of the endochrome is so different from that of all other species not only of the genus *Navicula* (of which I have studied about fifty species in this respect), but of all Naviculoid diatoms in general, that there can be no doubt as to the systematic place of this diatom: it is certainly not a *Navicula*.

I have observed a great number of living specimens of this species both in the Black Sea and the Mediterranean (Villefranche). Some of the valves here figured are so long and narrow that they seem to represent an intermediate form between the type species and the var. *perlonga*, Brun.



Dead shells of *O. scopulorum*,  
with endochrome.  $\frac{300}{1}$ .

*Okedenia scopulorum*, var. *fasciculata* (Grun.), Mer.  
(Pl. VII. figs. 6-8.)

Grunow, in Cleve, Mar. D. no. 178; Cleve, Syn. Navic. Diat. part i. p. 152.

The endochrome of this variety, of which I have observed only a few specimens in the Pacific Ocean (San Pedro, California), is in the main the same as in the type species, differing by the plates or granules not having the four elongated prolongations which are so characteristic of the type (fig. 7); in this variety the plates are quadrangular, more developed transversely than longitudinally, with their margins concave, and the two central plates alone are provided with short prolongations or rudiments of horns of the same kind as in the type. The number of plates is twenty, disposed in five pairs in each half of the frustule, not reaching its extremities. The centre of each plate contains a round pyrenoid, which is not united with the pyrenoid of the opposite plate. The elæoplasts are numerous; there are usually two of them between each two plates at their ends. When seen from the valve-face (fig. 8) the chromatophores appear to be very thick, but this is probably due to the presence of pyrenoids and does not represent their real thickness.

Length of the valve 0.072 mm. (according to Cleve 0.08-0.120 mm.), breadth 0.0062-0.0067 mm.

The valve is characterized by its linear form, not inflated in the middle (or only imperceptibly) nor at the ends.

Two or three other varieties of this species are known:—

(1) Var. *perlonga* \* (Brun), Mer.

Brun, *Diat. esp. nouv.* p. 39, pl. xv. fig. 2; Cleve, *Syn. Navic. D.* part i. p. 152. *Navicula famelica*, Castrac. *Osserv. Cicloph.* p. 9, according to De Toni.

Length 0.33–0.40 mm., breadth of valve 0.007 mm.; striae 18 in 0.01 mm.

(2) Var. *belgica* (V. H.), Mer.

*Navicula Johnsonii*, var. *belgica*, Van Heurck, *Syn. d. Diat. d. Belg.* Suppl. B, fig. 29. *Navicula scopulorum*, var. *belgica*, Cleve, *Syn. Navic. D.* part i. p. 152; Peragallo, *Diat. mar. d. Fr.* pl. viii. fig. 27.

Length 0.06–0.07 mm., breadth of valve 0.0075 mm.; striae 24 in 0.01 mm.; valve gibbous.

(3) Var. *delicatula*, Mer.

Finally I will mention here a very delicate and small form of which I have found a single specimen in San Pedro, California (fig. 5). The valve is very narrow, inflated in the middle and at the extremities, length 0.0427 mm., which agrees with the size of var. *belgica*, being only a little smaller; but the breadth of the valve, only 0.0024 mm., is much smaller than in the latter (0.0075 mm.); it seems therefore more likely to represent a new variety, which could be named var. *delicatula*, Mer.

Unfortunately the specimen was not in a sufficiently fresh condition to ascertain the structure of its endochrome in all its details. I have only noticed the presence of four coloured masses, which probably represent eight chromatophores. This form requires further examination.

*Okedenia inflexa* (Bréb.), Eul. (Pl. VII. figs. 9–11.)

*Amphipleura inflexa*, Bréb., Kützinger, *Sp. Alg.* p. 88. *Okedenia inflexa*, Eul. MS., Cleve, *Mar. Diat.* no. 192 (1879); Van Heurck, Type no. 167. *Amphora inflexa*, H. L. Smith, *Lens*, ii. p. 78, pl. ii. fig. 16 (1873); Cleve, *Syn. Navic. D.* part ii. p. 131; Peragallo, *Diat. mar. d. Fr.* p. 215, pl. xlix. figs. 1, 2; Van Heurck, *Treat. on Diat.* p. 135, fig. 25.

The endochrome of this species differs very little from

\* The figure which Peragallo gives of this variety (*Diat. mar. d. Fr.* pl. viii. figs. 28, 29) does not belong to it, the valve being much too short. Even my fig. 1 (which could with more propriety be referred to var. *perlonga*) is not nearly so long as the original fig. of Brun.

that of *O. scopulorum*. The chromatophores are of the same H-like shape, composed of two elongated bands united in the middle by a short transverse part (fig. 11), but they are much more elongated and always four in number; the middle part contains in its centre an elongated pyrenoid, which, however, here is confounded with the pyrenoid of the opposite plate, so that each pair of plates contain only one common pyrenoid (fig. 9). Cases where pyrenoids of two opposite plates are united into one are not unfrequent among diatoms; I have observed them in *Mastogloia Braunii*, Gr., *M. pumila*, Grun., *Amphora ostrearia*, Bréb., *A. lineolata*, Ehr., *Achnanthisidium brevipes* (Ag.), Cl., *A. glabrata*, Grun., *Hantzschia amphioxys* (Ehr.), Gr., *Licmophora flabellata* (Carm.), Ag., &c.; it also exists in some species of *Synedra* and *Fragilaria* (*F. hyalina* (Kz.), Gr., for instance).

The four plates with all their prolongations can be simultaneously seen only when the frustule takes an oblique position as represented in figure 10.

The only difference between the two species consists in the number of plates, of which there exist here only four, and, as a consequence, they are of greater length.

I have observed hundreds of living specimens of this species both in the Black Sea (Ialta, Crimea) and in the Mediterranean (Villefranche), and they all had a similarly constructed endochrome and the number of the chromatophores was invariably four\*.

*Okedenia inflexa* may be regarded as an asymmetrical form of *O. scopulorum*, the more so as the valve of the latter shows sometimes a marked asymmetry in its general form, but especially in the disposition of the raphe†. The form and structure of the frustule and of the valve of these two species, as well as their endochrome, thus points to their close affinity. It is true that the zone of *O. inflexa* is complex, while it is said to be simple in *O. scopulorum*, and Cleve places the latter in his subgenus *Microstigma*, characterized by a simple zone‡. But this is a mere supposition, not based on direct observation of the frustules of the species. In reality *O. scopulorum* has a complex zone (fig. 3), and the longitudinal

\* By the way, this diatom is certainly not an exclusively pelagic form, as is generally believed, although it sometimes occurs in pelagic gatherings; but I have usually found it, sometimes in great abundance, living at a depth of 4–10 metres among thin green *Cladophora*-like algæ. *Okedenia pontica*, Mer., lives under the same conditions.

† See Peragallo, *Diat. mar. d. France*, pl. viii. fig. 29. The valve itself in this figure is somewhat asymmetrical.

‡ Cleve, *Synops. of the Nav. Diat.* part i. p. 142.



divisions, although fine, can easily be seen even without an oil-immersion\*.

This fact is of great importance, as it shows once more that *O. scopulorum* and *O. inflexa* are very nearly allied forms. They have both very narrow elongated valves, with distant terminal nodules; the striæ in both are nearly of the same kind, the zone in both is complex, and last, but not least, the endochrome in both is almost the same. There can be no doubt, therefore, that they belong to one and the same genus. And since *O. scopulorum* cannot, on account of its endochrome (not to mention other characters), be a *Navicula*, neither is it possible to place it in the genus *Amphora*; therefore *O. inflexa*, being so nearly related to *O. scopulorum*, can neither be regarded as belonging to the genus *Amphora*. So it becomes necessary, as an inevitable conclusion, to establish a separate genus, the name of which cannot be otherwise than *Okedenia*, as it has already been applied to one of these species.

***Okedenia pontica*, Mer. (Pl. VII. figs. 17–19.)**

Mereschkowsky, Diat. d. l. m. Noire.

There are but few differences between this species and the preceding one if only dead shells are taken into consideration; the size is smaller, being about 0.075 mm. in length, the girdle-face is broader, but the endochrome is very different; the number of chromatophores is eight, which is as constant in this species as the number four is in *O. inflexa*. The form of the chromatophores also differs in some respects from those of the latter species, the horns are not so elongated and they are undulated instead of being straight. The two inner pairs of chromatophores are usually nearer to each other than to the outer pairs. Each pair of opposite chromatophores are united by a common central spherical pyrenoid (fig. 18).

I have observed this species by hundreds in the Mediterranean (Villefranche), and always with exactly the same structure of their cell-contents.

When the diatom is not in a very fresh condition the horns begin to contract and the plates take the appearance shown in fig. 19.

The zone is complex, as in *O. inflexa*.

\* I have seen these divisions, as represented in fig. 3, on unmounted specimens observed in water with Hartnack's objective IX. (water-immersion).

***Okedenia granulata*, Mer. (Pl. VII. figs. 12-16.)**

This species could hardly be distinguished at all from the preceding but for the endochrome, which is again quite different from that of all other species of this genus, having in common only the great number of chromatophores. These latter differ both in form and in their disposition. Their form is rounded, somewhat dilated transversely, without any trace of prolongations or horns (figs. 12, 14); there exist not even the concavities at their margins, as in *O. scopulorum*, var. *fasciculata*. They are usually eight in number, although they sometimes attain to eleven (fig. 16). The most important characteristic of this species consists, however, in the disposition of the granules. In all forms hitherto examined the chromatophores have been seen resting with their median line on the connecting-zone (see figs. 2, 7, 11); here they are *always* placed on the surface of the valves, with their margins alone resting on the zone (fig. 13). Usually they are situated at regular distances, each chromatophore of one valve being opposite that on the other valve (fig. 13); in a few rare cases I have found them to have an irregular disposition, as shown in fig. 16. When the diatom is dead the granules leave the surface of the valves and become scattered in the middle part of the frustule (fig. 15).

This position of the granules on the surface of the valves constitutes a character of such importance that the above-described form cannot be considered otherwise than a distinct species. It differs also in some respect by the frustule and the valve; the size is smaller, varying from 0.0456 to 0.057 mm.; the valve is less arcuate, the ventral margin being almost straight (figs. 12, 14), and the median line also seems to be almost straight\*; breadth of the valve 0.0052-0.0057 mm., breadth of the girdle-face 0.0095-0.0011 mm. Zone complex.

I have observed two dozen living specimens of this species in the Pacific Ocean (San Pedro, California), usually in Plankton material.

And now if we again refer to the Plate and compare the different figures (especially figs. 2, 7, 11, 12, 17) representing the endochrome of all these forms, we can easily see how closely allied they are in this respect, constituting, no doubt, a very uniform and natural group. And the form of

\* I have not yet had an opportunity of examining mounted specimens of this species.

their valves, as well as the structure of the connecting-zone, only confirms, as we have already seen, their relationship.

Thus, if all the above facts are taken into consideration, we cannot but believe in the re-establishment of the old genus *Okedenia*; its inner structure is so peculiar and so different from all other Naviculoid Diatoms that it seems necessary to separate it as a distinct family—the *Okedeniæ*.

The diagnosis of the genus *Okedenia* in its new sense is as follows:—

### OKEDENIA, Eul., s. emend.

*Valve* elongated, *very narrow*, linear, often inflated in the middle and at the extremities, straight and *symmetric or arcuate and asymmetric*, *terminal nodules* usually *distant* from the margin, *striæ* fine (18–24 in 0.01 mm.), *connecting-zone complex*. Endochrome composed of numerous *chromatophores*, from 4 to 38, usually of the shape of the letter H, sometimes rounded, disposed in pairs along the connecting-zone, rarely along the valves, *with a central pyrenoid* usually common to each pair.

#### *Analytical Key to the Species and Varieties of the Genus Okedenia (s. emend.).*

Valve symmetric, straight.

Valve inflated in the middle and at the ends.

Length 0.1–0.260 mm., breadth 0.009–

0.016 mm.; *striæ* 18–20 ..... *O. scopulorum* (Bréb.), Mer.

Length 0.33–0.4 mm., breadth 0.007

mm.; *striæ* 18 ..... *O. scopulorum*, var. *perlonga*

Length 0.06–0.07 mm., breadth

0.0075 mm.; *striæ* 24 ..... [(Brun), Mer.

Length 0.0427 mm., breadth 0.0024

mm.; 8 (?) *chromatophores* ..... [(V. H.), Mer.

Valve linear, not inflated; length 0.072–

0.120 mm., breadth 0.0062–0.0067

mm.; *striæ* 16–18; 10 *chromato-*

*phores* without horns ..... *O. scopulorum*, var. *fascicu-*

Valve asymmetric, arcuate.

[*tula*, Mer.

*Chromatophores* along the connecting-zones; ventral margin of the valve strongly concave.

4 *chromatophores* with long straight horns; length of the frustule 0.090–0.150 mm.; connecting-zone narrow ..... *O. inflexa* (Bréb.), Eul.

8 *chromatophores* with short undulated horns; length of the frustule 0.075

mm.; connecting-zone broad .... *O. pontica*, Mer.

Chromatophores along the valves, composed of 8-11 rounded granules; length of the frustule 0.046-0.057 mm.; ventral margin of the valve almost straight ..... *O. granulata*, Mer.

28th June, 1901.

# EXPLANATION OF PLATE VII.

- Fig. 1.* *Okedenia scopulorum* (Bréb.), Mer. Valve-view of a living specimen with endochrome. A transitional form to var. *perlonga*, Brun. Black Sea.  $\frac{630}{1}$ .
- Fig. 2.* Ditto. Girdle-face, with endochrome. Black Sea.  $\frac{630}{1}$ .
- Fig. 3.* Ditto. Girdle-face. Black Sea.  $\frac{630}{1}$ .
- Fig. 4.* Ditto. A dead frustule, with endochrome. Black Sea.  $\frac{315}{1}$ .
- Fig. 5.* *Okedenia scopulorum*, var. *delicatula*, Mer. Half-dead specimen. San Pedro, California.  $\frac{945}{1}$ .
- Fig. 6.* *Okedenia scopulorum*, var. *fasciculata* (Grun.), Mer. Valve. San Pedro, California.  $\frac{945}{1}$ .
- Fig. 7.* Ditto. Girdle-face of a living specimen, with endochrome. San Pedro, California.  $\frac{1260}{1}$ .
- Fig. 8.* Ditto. Valve of the same individual.  $\frac{1260}{1}$ .
- Fig. 9.* *Okedenia inflexa* (Bréb.), Eul. Valve-view of a living specimen, with endochrome. Black Sea.  $\frac{945}{1}$ .
- Fig. 10.* Ditto, in an oblique position. Black Sea.  $\frac{945}{1}$ .
- Fig. 11.* Ditto. Girdle-face, with endochrome. Black Sea.  $\frac{945}{1}$ .
- Fig. 12.* *Okedenia granulata*, Mer. Valve-view of a living specimen, with endochrome. Very typical. San Pedro, California.  $\frac{945}{1}$ .
- Fig. 13.* Ditto. Girdle-face of the same individual.
- Fig. 14.* Ditto. Valve-view of a living individual. San Pedro, California.  $\frac{945}{1}$ .
- Fig. 15.* Ditto. Girdle-face of a dead frustule; with endochrome. San Pedro, California.  $\frac{945}{1}$ .
- Fig. 16.* Ditto. Girdle-face of a living specimen. Not typical. San Pedro, California.  $\frac{945}{1}$ .
- Fig. 17.* *Okedenia pontica*, Mer. Girdle-face of a living individual, with endochrome. Mediterranean (Villefranche).  $\frac{945}{1}$ .
- Fig. 18.* Ditto. Valve-face of the same. Villefranche.  $\frac{945}{1}$ .
- Fig. 19.* Ditto. Girdle-face, with endochrome in not quite fresh condition. Villefranche.  $\frac{945}{1}$ .



LIII.—On *Stauronella*, a new Genus of Diatoms.

By C. MERESCHKOWSKY.

[Plate VIII.]

It has been shown, in my paper "*On Okedenia*"\*, what important results can be obtained if the study of diatoms is not confined to their dead shells alone, but if living specimens, and especially their endochrome, are also taken into consideration. It is there shown that a form generally thought to be a *Navicula* is not a *Navicula* at all, that a species referred to *Amphora* did not belong to that genus, and that both had to be united in a separate genus—*Okedenia*; also how easy it was to distinguish some of the species of this genus on account of their endochrome, which otherwise could hardly be distinguished even as varieties.

In the present note we have another example of the same kind. A diatom which is generally believed to belong to the genus *Navicula*, or to its section *Stauroneis*, proves, on account of its endochrome, not only not to belong to that genus, nor even to the family Naviculaceæ, but not to have any relation whatever to the whole tribe of the Naviculoid diatoms.

The diatom to which I refer is the so-called *Stauroneis constricta*, Ehr. It was first introduced into science by Ehrenberg, who described it under that name in 1843 in his work on American Microgeology. But its appearance is so peculiar and so distinct from all other species of the same genus, especially when observed from the girdle-face, that it was soon removed from the genus *Stauroneis* and placed by W. Smith† in the genus *Amphiprora*, which this diatom, indeed, somewhat resembles in its girdle-face; and most diatomists continued to name it *Amphiprora constricta* until a comparatively recent date. But this last genus was no more the right place for the diatom than the former one. At the time of W. Smith (1853–1856) *Amphiprora* was not well defined, and various heterogeneous forms have been united under this name; but since Rabenhorst, Pfitzer‡, and especially Cleve have more strictly limited it to forms with a sigmoid raphe, *Amphiprora constricta* could no longer remain there, its raphe being straight and not sigmoid;

\* *Suprà*, p. 415.

† W. Smith, 'Synopsis of the Brit. Diatomaceæ,' 1853–1856.

‡ E. Pfitzer, 'Untersuchungen über Bau u. Entwicklung d. Bacillariaceen,' 1871.

and so it was again removed to the Naviculaceæ, and placed by Cleve\* in the genus *Navicula*, section *Microstigmaticæ*, division or subgenus *Stauroneis*, under which name it has also recently been described by Peragallo†.

It can, however, be easily shown that this is not its proper place, that it has no real affinity to the Naviculaceæ, and that therefore this unfortunate diatom has again to be removed somewhere else. But since it cannot find a suitable home in any of the existing genera, it clearly results that it has to seek one elsewhere—in other words, it ought to form a new genus, which I propose to call *Stauronella*; and by so doing I hope all trouble with this unfortunate diatom will cease, and it will find in the new genus a well-merited rest.

As I intend to prove the necessity of constituting this new genus on account of its endochrome, we will now proceed to the description of the latter. It is, however, not on the type species that we will study the endochrome, but on a new variety (var. *linearis*, Mer.), the description of which will be given below.

The endochrome is composed of two plates, which are characterized by a very peculiar disposition, not to be found in any other species of Naviculoid‡ diatoms. Each half of the frustule, the superior and inferior, has its own plate, both being separated in the central part of the frustule by a transverse hyaline space, *i. e.* by an interval directed along the shorter axis; both plates rest by their median part on one of the connecting-zones (fig. 19), which might be called the dorsal connecting-zone. The margins of the plates rest on the surface of both valves, covering their whole breadth (figs. 16, 17, 19). When seen from the girdle-face these margins appear as dark lateral bands on both sides of the frustule (fig. 18, *c*); the lighter part, uniting them, corresponds to the median portion, which, as already mentioned, rests on the dorsal zone. The plates are rather short, occupying only the median portion of the frustule, and never reaching its extremities; the margins are usually entire (fig. 17), sometimes more or less sinuated (fig. 16). The transverse hyaline space which separates the two plates is always distinct, rather broad, excavated in the

\* P. Cleve, 'Synops. of the Navicul. Diat.' part i. p. 145.

† H. Peragallo, 'Les Diat. mar. de France, i. p. 56.

‡ I am using here the term Naviculoid not in the sense given by Cleve in his 'Synopsis of the Naviculoid Diatoms,' who uses it as a synonym of the Raphidian diatoms, but in the more restricted sense which is given to this term by Peragallo in his 'Diatomées marines de France,' p. 2.

centre, where it forms a more or less well-marked circular space, in which the nucleus is placed. The terminal ends of the plates may be straight (fig. 17) or provided with a more or less deep longitudinal sinus (fig. 16).

Each plate contains in its centre a conspicuous pyrenoid (figs. 16, 17, 19, *pr.*), composed of a refractive material, which is imbedded in the very substance of the chromatophore-plate, thus being limited on all sides by the coloured endochrome-mass. It forms a hemispherical protuberance projecting into the inner space of the frustule, almost reaching its central axis (figs. 16, 17), sometimes being separated from the walls of the frustule by a hemispherical hyaline space (fig. 16). This pyrenoid is, however, only seen when the diatom presents to the observer its valve-face; as soon as it is moved to one side or the other, even in a slight degree, it immediately disappears, a peculiarity which also belongs to the pyrenoids of most species of the genus *Nitzschia*. It is obvious that no trace of pyrenoids will be seen when the diatom presents its girdle-face, as in fig. 18. In this figure the centre of each plate, *i. e.* the centre of the lighter part of it, is the real place of the pyrenoid, and there it ought to be seen had it not become invisible. Such an absence of a visible pyrenoid in the girdle-face is also a characteristic of most of the *Nitzschia*.

The elæoplasts are round, of a comparatively large size, variable in number, placed at the outer and inner ends of the chromatophore-plates (fig. 18). The colour of the endochrome is yellow-brown.

As above described, the endochrome of *Stauronella constricta* appears to be of a very peculiar nature. In order, however, to understand in what this peculiarity consists, and so to appreciate its whole value, I shall have to enter into some general considerations concerning the endochrome of diatoms based on my rather extensive studies on this subject.

I have carefully studied the endochrome of over three hundred forms, amongst which not less than one hundred and fifty belong to the Naviculaceæ and Nitzschieæ. As a general result of the comparison of the endochrome of these two groups, I can state that the endochrome of the Naviculaceæ is of a quite different and even diametrically opposed type to that of the Nitzschieæ. In both groups the typical number of chromatophores is two; but while in the Naviculaceæ these plates have a longitudinal disposition, *i. e.* they are placed side by side and separated by a longitudinal interval along the longer axis of the frustule, each plate

occupying the right and left side of the frustule (see diagram fig. 1), in the Nitzschieæ each plate occupies the superior and inferior half of the frustule, thus being separated not by a longitudinal but by a transverse interval along the short axis of the frustule (fig. 3 of the diagram). This arrangement may be termed transverse disposition, as opposed to the longitudinal disposition of the Naviculaceæ. Whenever there are two chromatophore-plates in the Naviculaceæ they may be distinguished, according to their position, as the right and the left,

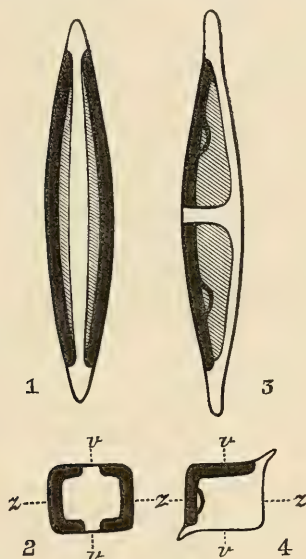


Diagram showing the typical disposition of the two chromatophore-plates in Naviculaceæ (figs. 1, 2) and Nitzschieæ (figs. 3, 4). Figs. 1 and 3, valve-view; figs. 2 and 4, transverse sections. *v*, *v*, valves; *z*, *z*, connecting-zones.

while in the Nitzschieæ when there are two plates they may be distinguished not as the right and left, but as the superior and inferior. Even in such cases as *Cylindrotheca*, *Nitzschia dissipata*, *Homocladium Martianum*, &c., where the number of chromatophores is more than two, they form two groups—a superior and an inferior—separated by a transverse interval, instead of forming a right and left group, as is the case in *Okedenia*, where the number of chromatophores is also large.

I can positively affirm that I have not met a single case of



a transverse disposition of the chromatophores in the whole section of Naviculoid diatoms\*.

If now we compare figures 16-18 of the Plate with the diagrams figs. 1 and 3, we can easily see that the endochrome of *Stauronella constricta* belongs to the *Nitzschia* type, and not to the *Navicula* type.

There is another difference between the endochrome of Naviculaceæ and Nitzschieæ. In all the former the two plates (or the two pairs of plates if there are four), if not resting on the valves, as in the Punctatæ† and Lyratæ, are applied to both connecting-zones (diagram fig. 2). In the Nitzschieæ both plates rest on one connecting-zone (with their margins resting on one or both valves), the other zone being free (diagram fig. 4), and this is exactly the position which the two chromatophores of *Stauronella constricta* occupy (Pl. VIII. fig. 19). Lastly, I could point to the conspicuous pyrenoids, which are very rare in true Naviculaceæ (except in such genera as *Cymbella*, *Gomphonema*, &c., which are provided with pyrenoids) and very common amongst the Nitzschieæ.

It is only when all these various facts are taken into account that the peculiar structure of the endochrome of *Stauronella constricta* acquires all its importance. This species is most assuredly not a Naviculoid diatom, its endochrome being of the type characteristic of the Nitzschieæ.

But what is it, then? Does it belong to the Nitzschieæ?

\* It may be objected that in *Mastogloia*, in which, according to Cleve (Syn. Navic. Diat. part ii. p. 142), there are only two plates, these latter have the same transverse disposition as in *Nitzschia*, with a line of separation along the short axis of the frustule; but in reality this is not so. My observations on the endochrome of *Mastogloia* have shown that this genus has four plates, and not two, as stated by Cleve; two of these plates belong to the right side of the frustule and two to its left side, both pairs being separated by a longitudinal interval. We have therefore in *Mastogloia* the same disposition as in *Navicula*, only with the difference that each plate is divided transversely, thus forming in all four plates. Some other genera characterized by the presence of four plates (*Scoliotropis* [Cleve], *Neidium*, *Tropidoneis*, *Pleurosigma*, *Toxonidea* [Mereschkowsky]) are similarly placed. Although in all these cases there exists, as in *Nitzschia*, a transverse separation in the middle of each plate, dividing them in two plates (superior and inferior), yet at the same time both pairs of one side of the frustule are separated from the pair of the opposite side by a longitudinal interval. So that in reality the four plates of all these genera (including *Mastogloia*) have the same disposition as the two plates of *Navicula*, the right plate of *Navicula* being represented by a right pair of plates and its left plate by a left pair.

† I have found the endochrome of the Punctatæ to be of the same kind as that of the Lyratæ.

By no means. The structure of the frustule is opposed to such a conclusion. And, further, there are other groups of the Raphidian diatoms which are equally characterized by a transverse disposition of their two chromatophore-plates. Such is the case, for instance, with certain *Amphiproræ*. It is generally admitted that *Amphiprora* has a single chromatophore \*; but here, again, my researches have shown that this is not quite so. It is true that *A. paludosa* has a single chromatophore-plate, but in several other species I have found two plates—a superior and an inferior—separated in the middle by a transverse interval, exactly as in *Nitzschia*. *Stauronella constricta* cannot, however, as already mentioned, take its place in the genus *Amphiprora*, its raphe being straight and not sigmoid as in that genus. We come therefore to the inevitable conclusion that this diatom belongs to a new genus—*Stauronella*—nearly allied to *Amphiprora*, and forming with the latter a transitional group between the Raphideæ and Carinatæ †. It represents, in my opinion, a remnant of a very old, now almost extinct, group of diatoms, which I propose to call **Archaidæ**. This is a central group from which have sprung on one side the Raphidian Diatoms and on the other the Carinatæ (*Nitzschieæ*, *Surirelloideæ*). As remnants of this group or as living representatives of the Archaidæ I consider the genera *Stauronella*, *Amphiprora*, *Amphoropsis* ‡, *Auricula*, and *Epithemia*. This theory will be explained more completely in a paper now in course of publication.

\* Cleve, *Syn. of the Navic. Diat.* part i. p. 13.

† In my paper “*Sur la Classification des Diatomées*” (*Scripta Botanica*, St. Petersburg, fasc. xviii.) I have established a new system of classification of the Diatoms, in which I divide them first in two groups—the Mobiles, provided with a slit or a series of holes in the walls of the frustule, and therefore being endowed with movement; and the Immobiles, without such a structure, and therefore unmovable. The Mobiles are again divided in two groups—the Raphidiæ in the generally accepted sense, and the Carinatæ, comprising the *Nitzschioideæ* and *Surirelloideæ*. The Immobile diatoms are also divided in two groups—the *Bacilloideæ*, including the *Pseudoraphidiæ* with the exclusion of the Carinatæ; and the *Anaraphidiæ* in its old acceptance. I hope that this system, which has the advantage of doing away with the highly artificial group *Pseudoraphidiæ*, will be generally accepted by diatomists as being at the same time simple and very natural.

‡ Under the name of *Amphoropsis* I unite forms with a straight raphe elevated on a keel turned in the same direction, with asymmetrical valves and with two chromatophores disposed transversely, or with granules. The following species belong to this genus:—*A. recta* (*Tropidoneis recta*), *A. conserta* (*Trop. conserta*), *A. pontica*, sp. n., *A. stauroneis*, Mer., and probably *A. Van Heurckii* (*Trop. Van Heurckii*).

The diagnosis of the genus *Stauronella* is as follows:—

### STAURONELLA, Mer.

Valve narrow, linear or attenuated towards the ends, usually constricted in the middle; extremities truncate or rounded, rarely cuneate. Raphe straight, symmetric; central nodule elongated transversely in a stauros. Girdle-face constricted, zone complex. Endochrome composed of two plates disposed transversely along one of the connecting-zones; each plate with a conspicuous pyrenoid.

Contains one species, *S. constricta* (Ehr.), Mer., with several varieties.

This diatom has not yet been sufficiently well described, and the figures, especially those of the girdle-face, are very unsatisfactory. I will therefore give here a good description of it, accompanied by figures, and then pass to the consideration of a new variety.

#### *Stauronella constricta* (Ehr.), Mer.

(Pl. VIII. figs. 1–6.)

*Stauroneis constricta*, Ehrenberg, Amer. pl. i. 2, fig. 12 b; Peragallo, Diatomées mar. d. France, p. 56, pl. vii. figs. 32, 33. *Stauroneis* (*Libellus*) *constricta* (Ehr.?), W. Sm., Cleve, Syn. Navic. Diat. part i. p. 145 (ex parte). *Amphiprora constricta*, W. Smith, Brit. Diat. i. pl. xv. fig. 126\*. *Stauroneis amphoroides*, Grun. (ex parte), A. Schm. Atlas, xxvi. figs. 37–39.

*Diagnosis*.—Valve convex, narrow, linear-lanceolate, constricted in the middle, attenuated towards the extremities, which are broad, truncate. Central nodule extending transversely in a narrow stauros, reaching the margins. Striæ 25–27 in 0.01 mm. (Cleve), transverse. Axial area indistinct. Girdle-face narrow, constricted in the middle, where the stauros appears as a brilliant bead, narrowed towards the ends. Zone complex. Length 0.021–0.056 mm. (average 0.04 mm.); breadth of valve 0.0052–0.0081 mm.; breadth of girdle-face 0.0076–0.0105 mm., at the constriction 0.0057–0.0086 mm.

*Locality*. North Sea (*Cl.*)?; Black Sea (Sebastopol, mar., *Mer.*); Mediterranean (Nice, mar., *Per.*). Fossil: Crimea, Kertch (sarmatische Stufe, mar., *Mer.*).

\* Not being in possession of the work of W. Smith, I am unable to say whether this quotation which I give after Cleve is correct or not. Cleve gives also as synonym the *Navicula simulans* of Donkin (Brit. Diat. p. 60, pl. ix. fig. 3). But, as Van Heurck has shown ('A Treatise on the Diatomaceæ,' p. 235, pl. xxvii. fig. 784), this latter represents quite a different species. Whether it belongs to *Stauronella* or not cannot be decided without knowing its endochrome; it is, however, not likely to be the case, as the girdle-face does not at all resemble that of *S. constricta*.

The valve of the type species is never linear, as described by some authors, but always considerably attenuated towards the ends; the latter are invariably truncate, the middle part being more or less constricted, with a few exceptions amongst small individuals (fig. 6). The form of the valve is very constant, the only variation consisting in its greater or less breadth: fig. 5 represents a narrow form, the valve being more linear; fig. 2 is more typical.

The girdle-face is very badly reproduced by A. Schmidt (Atl. xxvi. fig. 37) as well as by Peragallo (D. m. d. Fr. pl. vii. fig. 32); both figures represent it in an oblique position, and give no idea whatever of its real appearance. This is due to the fact that the diatom under consideration has, it appears, never been studied on raw material, as it ought to be, but only on mounted specimens in slides, from which it usually disappears during the cleaning of the material. I have seen hundreds, perhaps thousands, of frustules, and fig. 1 (Pl. VIII.) represents a typical specimen of it; fig. 4 is also good. Sometimes two frustules are united by their sides, as in fig. 3, and such cases show a striking resemblance to Ehrenberg's figure\*. This removes all doubt as to the identity of *Stauroneis constricta* of Ehrenberg with the form here described.

The outlines of the frustule are strong and coarse, the constriction in the middle always well marked; the stauros appears as a very bright round bead. The extremities are more (figs. 3, 4) or less (fig. 1) narrowed, the ends being roundly truncate, more distinctly truncate when the frustule is broad (fig. 4). The zone is very finely but distinctly striate in a longitudinal direction, the striæ or divisions (5-6 in number) never terminating in marginal puncta as in var. *linearis*.

I give here a series of individual measurements, which show that the size is far from being so large as stated by Cleve (0.05-0.14 mm.), who was evidently in possession of some variety.

Length.	Breadth of	At the
mm.	the frustule.	constriction.
	mm.	mm.
0.021	0.0076	0.0057
0.025	0.0095	0.0086
0.0266	0.0095	0.0067
0.0266	0.0086	
0.0285		

---

\* I have not seen the original figure, but only its reproduction in Wolle's 'Diat. of America.'



Length.	Breadth of	At the
mm.	the frustule.	constriction.
mm.	mm.	mm.
0.0295	.....	.....
0.0295	0.0076	0.0057
0.042	.....	.....
0.0437	0.0095	0.0067
0.0437	.....	.....
0.0445	0.0086	.....
0.0466	0.0095	0.0076
0.0466	.....	.....
0.0475	.....	.....
0.0475	.....	.....
0.048	0.0086	0.0067
0.049	.....	.....
0.050	0.0105	0.0086
0.050	.....	.....
0.052	0.0105	0.0086
0.055	.....	.....
0.056	0.0105	0.0086
<hr/>		
Average .. 0.0413	0.0092	0.0073

Var. *linearis*, Mer., nov. var. (Pl. VIII. figs. 7-19.)

*Diagnosis*.—Valve narrow, linear or slightly attenuated at the ends, which are broadly rounded, never constricted in the middle. Girdle-face rather broad, quadrangular, slightly constricted, with round angles; extremities broadly truncate. Divisions of the zone terminating in marginal puncta, the four outer ones being very conspicuous. Length 0.015-0.053 mm. (average 0.037 mm.); breadth of valve 0.0048-0.0067 mm.; breadth of girdle-face 0.0095-0.012 mm., at the constriction 0.009-0.0095 mm.

*Locality*. Le Havre, North France (mar.); Black Sea, Crimea (Ialta, Sebastopol, somewhat brack. and mar.).

Of this variety I have seen a very great number of individuals in the Black Sea. In one gathering from Ialta (Crimea) I found it in an almost pure condition, with only occasionally a few specimens of the type species; in another gathering from Sebastopol it was the type species which predominated, only very few individuals of var. *linearis* being mixed with it. This shows that the var. *linearis* is really distinct, while intermediate forms prove it to be only a variety.

The valves are sometimes perfectly linear (figs. 10, 17), but as frequently, if not more, they are somewhat attenuated at the ends (figs. 7, 11, 15), the extremities being sometimes a little produced (figs. 13, 16); the ends are not truncate, as

in the type, but usually broadly rounded, never cuneate and so acute as in fig. 35, pl. xxvi., of A. Schmidt's 'Atlas.' The main distinction, however, between var. *linearis* and the type as regards their valves consists in the absence of any constriction in the middle of the valve.

The girdle-face presents a still greater number of distinctive features. It is broader, more quadrangular, the lateral margins are not so convex and the median constriction so marked; the extremities are more truncate. The longitudinal divisions of the zone terminate with a punctum, of which the four outer puncta, situated inside the terminal nodules, are very conspicuous. This latter characteristic, insignificant as it may appear, is nevertheless very constant and readily distinguishes var. *linearis* from the type species, which never has the above-mentioned four puncta. The size is also a little smaller, averaging 0.037 mm., instead of 0.0413 mm.

The following are some individual measurements:—

Length.	Breadth of the frustule.	At the constriction.
mm.	mm.	mm.
0.015	0.0095	0.009
0.016	0.0095	....
0.02	0.0076	....
0.02	0.0086	....
0.024	0.0086	....
0.031	0.0105	0.0086
0.040	0.013	0.0105
0.041	0.0114	0.0095
0.041	0.012	0.0095
0.041	0.017	0.0143
0.0427	0.0105	....
0.0427	0.0105	0.0076
0.050	0.0105	0.0076
0.050	0.012	0.0095
0.052	0.0114	0.0086
0.053	0.0114	0.0095
0.053	0.012	0.0095
Average .. 0.037	0.0109	0.0095

If we compare the measures of the type species with those given by Cleve (length 0.05–0.140 mm.) we can clearly see that the form described by this author is not the same as that which has been figured by Peragallo and described by me. In all probability it represents a peculiar large variety, which ought to be distinguished as var. *major*. Peragallo,

speaking of such forms, says :—" Je n'ai jamais vu de grandes formes de cette espèce, signalée surtout dans l'Océan (Atlantic) et les mers arctiques, les petites formes telles que celles que j'ai dessinées sont peut-être spéciales aux mers chaudes " \*. The locality of var. *major* would be, according to Cleve :—Davis Strait; North Sea.

Another variety seems to be the form figured in A. Schmidt's 'Atlas,' pl. xxvi. fig. 35. Valve linear, with cuneate, sub-acute ends, not constricted in the middle; stauros narrow, not reaching the margins. Girdle-face unknown. The girdle-face represented by fig. 36 is no doubt an *Amphora* (a form of *A. lævis* or *A. ostrearia*), and certainly has nothing to do with fig. 35. This variety, of unknown origin, may be named var. *cuneata*.

4th July, 1901.

#### EXPLANATION OF PLATE VIII.

[All figures are magnified 1260 times.]

- Fig.* 1. *Stauronella constricta* (Ehr.), Mer. A typical girdle-face.  
*Fig.* 2. Ditto. A typical valve belonging to the same individual.  
*Fig.* 3. Ditto. A double frustule.  
*Figs.* 4, 5. Ditto. Both figures refer to the same individual.  
*Fig.* 6. Ditto. One of the smallest individuals observed.  
*Fig.* 7. *Stauronella constricta*, var. *linearis*, Mer. First type of valves (see also fig. 11).  
*Fig.* 8. Ditto. A typical girdle-face, same individual as fig. 7.  
*Fig.* 9. Ditto. Girdle-face belonging to the valve fig. 10.  
*Fig.* 10. Ditto. Second type of valves, perfectly linear (see also fig. 17).  
*Fig.* 11. Ditto. First type of valves (see also fig. 7).  
*Figs.* 12–15. Ditto. Small individuals.  
*Figs.* 16, 17. Ditto. Endochrome in the valvular aspect; *pr.*, *pr.*, pyrenoids.  
*Fig.* 18. Ditto. Endochrome in the zonal aspect.  
*Fig.* 19. Ditto. Diagram representing an ideal transverse section of a frustule along the line *a b* in figs. 17 and 18, and showing the disposition of the chromatophores; the dentitions on the zone-faces indicate the longitudinal divisions of the zone; *pr.*, pyrenoid.

All figures represent individuals from the Black Sea.

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\* Peragallo, Diat. mar. d. Fr. p. 57.

## LIV.—On a Collection of Bats from Paraguay.

By OLDFIELD THOMAS.

THE British Museum has recently received from Mr. W. Foster a collection of bats made by him in Central Paraguay, a region of particular interest and importance to all mammalogists on account of the large number of species described by Azara from there, species many of which have been hitherto by no means satisfactorily identified. I have therefore worked out Mr. Foster's beautifully-prepared collection with unusual pleasure, and have been rewarded by finding in it authentic topotypical examples of eight of Azara's thirteen bats and also two species new to science. The latter are both members of the genus *Molossus*, a group in which Mr. Foster has been extraordinarily successful, as he has sent home examples of no less than six species of it, a very surprising proportion out of only nineteen species altogether.

I have also taken the opportunity of comparing with the Paraguayan bats the specimens sent by the late Mr. R. Perrens from Goya, on the Parana, further south in Corrientes. These, for want of Paraguayan material, I have hitherto had to treat provisionally as representing Azara's species, but I now find that in two cases at least they differ sufficiently to require separation.

1. *Vespertilio dorianus*, Dobs.

♂. Villa Rica. 16th February, 1901.

♂, 4 ♀. Sapucay. February, March, and May.  
Forearms 37 to 39 millim.

2. *Lasiurus borealis bonariensis*, Less. & Garn.\*

♂, ♀. 24th February and 10th March.

The Red Bat was not observed by Azara, his *Chauve-souris septième*, the basis of *Vespertilio villosissimus*, Geoff., being clearly a southern representative of the Grey Bat (*Lasiurus cinereus*, P. de Beauv.).

3. *Dasypterus ega argentinus*, Thos.

*Dasypterus ega argentinus*, Thos. Ann. & Mag. N. H. (7) viii. p. 247.  
(1901).

♀. Sapucay. 18th March. "Caught flying."

4. *Myotis albescens*, Geoff.

*Chauve-souris douzième*, Azara; the basis of *Vespertilio albescens*, Geoff.

♀. Tacuaral. 12th November, 1900.

\* Cf. Allen, P. Biol. Soc. Wash. xiii. p. 165 (1900).



This specimen, like others collected at Goya by Mr. R. Perrens, has the characteristic whitening of the posterior abdomen on which the name was founded. The wings are also narrowly edged with white. The next species has the abdomen brown throughout.

#### 5. *Myotis nigricans*, Wied.

♂, 3 ♀. Villa Rica. February.

3 ♂, 1 ♀. Sapucay. January and February.

These specimens differ from *M. albescens* by their uniformly dark bellies and other details, and are evidently specifically distinct. Rengger supposed the two forms to be identical.

#### MOLOSSUS.

Mr. Foster obtained no less than six species of *Molossus*, using this name in the larger sense employed by Dobson. The study of these convinces me that the dental formula in this group, however convenient as an index to determination, is emphatically not a true guide to mutual relationship. Those who wish that genera should be really genetic groups should not therefore use "*Promops*," "*Myopterus*," and *Molossus* as separate genera, unless skull-structure and not dental formula is made their basis.

To commence with: *M. Fosteri*, with the external peculiarities of *rufus*, therefore of true *Molossus* (s. s.), has four lower incisors as in *Promops* and *Myopterus*; while as regards its small upper premolar, of six specimens, three have got it, as in "*Promops*," and three have not, as in *Molossus* and *Myopterus*. The same variation occurs in *M. nasutus*.

Then it is quite evident that the broad-faced flat-headed species *cerastes*, *planirostris*, and *Temminckii* form a natural group quite apart from the others. But the last-named has a different number of lower incisors to the first two, while *maurus* (really, I think, more closely allied to "*Promops*" *abrasus* and *glaucinus*) has the dental formula of "*Myopterus*" *planirostris* and *cerastes*.

Mr. Miller is now engaged on a revision of the group, and from his use of "*Promops*" in describing new species, I presume he intends to use that as a genus. If this is the case, I shall be interested to see both how he deals with *Molossus nasutus* and *Fosteri*, and whether, if he takes *Temminckii* from the *planirostris*-group and puts *maurus* into it, he will still be prepared to maintain that his genera have, as they should have, genetic relationship as their basis.

The following is a key, by skull-characters only, to the species in Mr. Foster's collection:—

## A. Skull arched, tapering anteriorly.

a. Two lower incisors. Upper  $p^1$  absent. $a^2$ . Size larger..... *M. rufus*. $b^2$ . Size smaller..... *M. obscurus*.

b. Four lower incisors.

 $a^2$ . Upper  $p^1$  minute or absent. A median crest. *M. Fosteri*. $b^2$ . Upper  $p^1$  well developed. No median crest.. *M. bonariensis*.

## B. Skull flat, broad anteriorly.

a. Size large. Four lower incisors..... *M. cerastes*.b. Size small. Two lower incisors..... *M. Temminckii*.6. *Molossus rufus*, Geoff.

Azara's *Chauve-souris sixième*, on which *Molossus castaneus*, Geoff., is based.

♂, 2 ♀. Villa Rica. 24th January, 9th and 10th April.

Azara's sixth bat, the *Chauve-souris châtaïne*, has been generally considered, on account of its "fil ou ruban aigu qui se rend à la pointe du museau" and its size (spread 370 millim.), as being *M. rufus*, Geoff., or an allied local form.

This reference I am, on the whole, inclined to confirm, for Mr. Foster's specimen agrees very well with the descriptions both of Azara and Rengger, and may therefore be taken to represent *M. castaneus*. The one flaw in the description, the "blanchâtre en dessous," is equally inapplicable to any other allied species.

It is true that with the same exception the description would almost equally well fit *Molossus Fosteri*; but as it has to be allocated to one or other of the two local species, and the present one seems nearer in size, has a more perfectly "lenticulaire" antitragus, and with only two lower incisors is nearer Azara's "sans . . . incisives" than *M. Fosteri* with four, I propose to avail myself of my privilege as first reviser and to assign the name *castaneus* to the species with which I think it has most in common.

Should further material show the Paraguayan form to be distinguishable from the Brazilian, the name *castaneus* will then have to be revived for it.

7. *Molossus obscurus crassicaudatus*, Geoff.

Azara's *Chauve-souris dixième*; the basis of *Molossus crassicaudatus*, Geoff.

2 ♂, 3 ♀. Villa Rica. February and March.

♀. Paraguari. 22nd April.

These specimens are rather smaller and their skulls are markedly lighter and more delicate, with smaller brain-cases, than those of Brazilian examples, so that I provisionally use as a subspecific name the term applied by Geoffroy to

Azara's tenth bat—the “pardo acanelado” of the Spanish edition. Their forearms measure 36 to 39 millim.

But comparing with these the series obtained at Goya by Mr. Perrens, it is interesting to find that the latter are, on the contrary, the largest of all the forms assigned to the common and widely-spread “*Molossus obscurus*.” So marked is the difference, that the Corrientes form should clearly have a special name, and may be called

*Molossus obscurus currentium*, subsp. n.

Similar in all essential characters to *M. obscurus* as described by Dobson. Size larger than in other subspecies, and especially than in the geographically nearest *M. o. crassicaudatus*. General colour paler than usual, near but rather darker than Ridgway's “broccoli-brown.” But some examples are more rufous. Scarcely paler below. In correlation with the greater size, the cranial crests, especially the lambdoid ones, are of unusual development.

Dimensions of the type (measured in flesh):—

Forearm 42 millim. (other specimens 40, 40·5, 40·6, 41, and 42).

Head and body 78; tail 36; ear 14.

Skull: length from gnathion to occipital surface above foramen magnum 18·4; interorbital breadth 5·7; intertemporal breadth 3·6; front of canine to back of last molar 6·8.

An adult female skull measures 17·9 by 12 in greatest breadth.

*Hab.* Goya, Corrientes.

*Type.* Male. B.M. no. 98. 3. 4. 28. Collected 1st October, 1896, by Mr. R. Perrens. Eleven specimens examined.

In *M. o. crassicaudatus* the skull-length, measured as above, is about 16·5 to 17 millim., and in a series from São Paulo, representing *velox*, Temm., about 17·5 millim.

8. *Molossus Fosteri*, sp. n.

2 ♂, 4 ♀. Villa Rica and Sapucay.

Similar to *M. nasutus*, but very much smaller.

Small upper premolar minute or absent. Lower incisors four.

Size intermediate between *M. rufus* and *obscurus*. Ears rather small, rising close together at the hinder end of a distinct thread-like rim running along the muzzle from the nose, just as in *M. nasutus*; inner margin nearly straight, tip broadly rounded off, outer margin slightly convex; antitragus about as high as long, nearly circular, though less

exactly so than in *M. obscurus*, owing to the antero-superior edge being flattened. Tragus minute, linear. A distinct gular sac in the male.

Fur fine and silky; hairs of back about 5 to 6 millim. in length. Distribution of fur much as in *M. rufus*, but with rather more hair on the distal part of the forearm and on the proximal part of the fourth finger. General colour above dark glossy chocolate-brown, varying considerably in tone; the bases of the hairs light, but not for so great an extent as in *M. obscurus*. Under surface also brown, but without gloss.

Skull distinctly of the *M. nasutus* pattern, high, swollen, and bulbous in the brain-case and narrowed in the face. Median crest present but not high, and not running back to meet the lambdoid ridges posteriorly, there being a small triangular space on the crown quite smooth and unridged, even in the oldest specimens seen. Palate deeply arched between the teeth, as in *M. nasutus*. Chin strongly developed, projecting downward.

Upper incisors well thrown forward, more so than in *M. obscurus*. Anterior premolar, when present, exceedingly minute, smaller even than the minute outer lower incisors; altogether absent in three specimens out of six. Lower incisors four. Anterior lower premolar about half the height of the second, in the tooth-row, not crushed.

Dimensions of the type, measured in the flesh:—

Forearm 48·5 millim. (other specimens: ♂, 47·5; ♀, 47·5, 48, 48·5, 49).

Head and body 76; tail 54; spread 354.

Skull: greatest length 18·5; basal length 15; greatest breadth 11·3; interorbital breadth 6·2; intertemporal breadth 3·7; front of canine to back of *m*<sup>3</sup> 6·8.

*Hab.* of type. Villa Rica.

*Type.* Male. B.M. no. 1. 8. 1. 17. Collected 26th February, 1901.

This distinct species is, with its larger ally *M. nasutus*, interesting from its annectant nature, having the general characters of the *Molossus rufus* and *obscurus* group, with a wholly different dental formula. The variation in the presence or absence of the small upper premolar is especially noticeable, three out of the six specimens having the tooth and three not; the same variation is to be observed in *M. nasutus*, in which of the two Museum specimens one has the tooth and the other has not.



9. *Molossus bonariensis*, Peters.

♀. 62. Asuncion. 16th August, 1900.

This very distinct species was obtained in some numbers by Mr. Perrens at Goya, and Mr. Graham Kerr also caught two examples at Waikthlatingmangyalwa, in the Northern Chaco.

Although larger, the skull of *M. bonariensis* has in general shape and the absence of median crests a very considerable resemblance to that of *Promops nanus*, Miller.

10. *Molossus cerastes*, sp. n.

2 ♂. Villa Rica. 22nd and 26th January.

2 ♀. Sapucay. 9th and 10th June.

General characters of *M. planirostris*, but enormously larger.

Size as large as in *M. rufus*, but the wings proportionally shorter.

Fur of medium length, not so short as in *M. planirostris*; hairs of back 3 to 3.5 millim. in length, the longer hairs over the shoulders. Fur extending on to base of forearm, on to membrane external to terminal half of forearm, and on to base of fifth finger above, and on to base of interfemoral above and below. Elsewhere the membranes and limbs are naked, except for the usual hairs on the toes. Colour uniform brown ("Prout's brown," or darker) above and below\*, the hairs not or scarcely paler at their bases. Face, ears, and wing-membranes blackish. Ears short, triangular, their tips broadly rounded; keel distinct, not flattened externally; antitragus as high as long, not overlapping its base anteriorly or posteriorly; tragus triangular. A distinct gular sac present in male.

Skull remarkably broad and flat. Preorbital ridges heavily developed, so that the breadth across them is equal to that across the brain-case. Cranial crests evident, more developed than in *planirostris*, the sagittal meeting the lambdoid crests in a high helmet-like projection.

Upper incisors large, vertical, parallel, their tips not touching each other, and their bases separated from the canines. No trace of the small anterior premolar. Lower incisors four. Anterior lower premolar three-fourths the height of the second, crushed between the latter and the canine.

\* The two female specimens, killed in June, are much paler and brighter than the two males. Their general tone is almost cinnamon-brown.

Dimensions of the type, measured in the flesh :—

Forearm 46 millim. (other specimens 44–46).

Head and body 90; tail 38; spread 351. First finger, metatarsus 46, first phalanx 21·5, second phalanx 19·5; fifth finger, metacarpus 27, first phalanx 13·5.

Skull: length in middle line exclusive of crests 21; basal length 18·1; zygomatic breadth 15·2; anteorbital breadth 10; intertemporal breadth 5·2; front of canine to back of  $m^3$  8·5.

*Type.* Male. B.M. no. 1. 8. 1. 13.

This fine species is a giant relative of *M. planirostris*, and is particularly noticeable for the extreme flatness and breadth of the skull.

It is interesting to observe how many species of this group run in couples, the pairs distinguished *inter se* mainly by size. Thus *M. cerastes* is a larger form of *planirostris*, *rufus* of *obscurus*, *glaucinus* of *nanus*, *nasutus* of *Fosteri*, and *perotis* of *Trumbulli*.

### 11. *Molossus Temminckii*, Lund.

2 ♂, 4 ♀. Sapucay. January to April.

Specimens of this species obtained by Mr. Perrens at Goya are not quite similar in colour to the Paraguayan ones, but the difference appears to be due to season.

Thanks to the kindness of Dr. Winge, I have had the opportunity of comparing with the Goya and Paraguay sets typical skins from Lagoa Santa. I can find no difference of any importance between them.

### 12. *Artibeus lituratus*, Licht.

*Chauve-souris première*, Azara; the basis of *Phyllostoma lituratum*\*, Licht., 1823.

♂. Asuncion. 17th February.

2 ♂, 2 ♀. Sapucay. February, April, and June.

This is the common large *Artibeus* ordinarily but erroneously called *A. perspicillatus*, Linn. †

### 13. *Nyctinomus laticaudatus*, Geoff.

Azara's *Chauve-souris huitième*; the basis of Geoffroy's *Molossus laticaudatus* (Ann. Mus. vi. p. 156, 1805).

*Nyctinomus gracilis*, Wagn., of Dobson and others.

2 ♂, 4 ♀. Sapucay. 22nd May, 1901. "31 specimens were caught at one time in a hollow tree."—W. F.

\* Illiger used this name in 1815 (Abh. Ak. Berl. 1811, p. 109, publ. 1815), but only as a *nomen nudum*.

† Cf. Ann. & Mag. N. H. (7) viii. p. 192 (1901).

There appears to be no doubt about this identification. Azara's statement that "la lèvre supérieure a beaucoup de rides verticales" shows that his animal was a *Nyctinomus*, not a *Molossus*, and the "*autre petite oreille verticale en dessous*," in the description of the ear, indicates the species commonly known as *N. gracilis*, with its high vertical anti-tragus. Size, colour, and locality all agree perfectly. The other Paraguayan *Nyctinomus*, *N. brasiliensis*, is no doubt Azara's *Chauve-souris neuvième*, which "n'a pas la seconde oreille verticale de la précédente" (*cf.* Ann. & Mag. N. H. (6) xx. p. 215, 1897).

14. *Hemiderma perspicillatum*, Linn.\*

*H. brevicauda*, Wied, auctorum.

2 ♂. April and June. 4 ♀. 27th May, 1901. All from Sapucay.

15. *Glossophaga soricina*, Pall.

2 ♂. Sapucay. March and June.

From the description of both teeth and interfemoral membrane, it is clear that Rengger's *Glossophaga villosa* is not a *Glossophaga*, but its exact determination is not easy. It is perhaps a *Lonchoglossa* with the proportions of the upper incisors transposed.

One of the present specimens has an atavistic anterior upper premolar present on the left side.

16. *Vampyrops lineatus*, Geoff.

*Chauve-souris seconde*; the basis of *Phyllostoma lineatum*, Geoff. (Ann. Mus. xv. p. 180, 1810).

1 ♂, 5 ♀. Sapucay. March, May, and June.

These beautiful specimens are by far the most richly marked of the group that I have ever seen. Their brown colour forms a good setting for the bright and well-defined white lines of the face and back.

17. *Pygoderma bilabiatum*, Wagn.

2 ♂. Sapucay. February and March.

This peculiar bat is still but sparsely represented in collections, and these are the first properly made skins that the British Museum has received. It has not previously been recorded from Paraguay.

\* *Cf.* Ann. & Mag. N. H. (7) viii. p. 192 (1901).

18. *Sturnira lilium*, Geoff.

*Chauve-souris quatrième*, Azara; the basis of *Phyllostoma lilium*, Geoff.

3 ♂, 1 ♀. Villa Rica. October 1900, and January and June 1901.

3 ♂. Sapucay. February and March.

19. *Desmodus rotundus*, Geoff.

Azara's *Chauve-souris troisième*; the basis of Geoffroy's *Phyllostoma rotundum* (Ann. Mus. xv. p. 181, 1810) \*.

*Desmodus rufus* auctorum.

2 ♂, 4 ♀. Sapucay. 11th May, 1901. A number caught in a hollow tree.

"The most pugnacious of any bat that I have handled, extremely quick in their movements, and carry their body high when running. Fight fiercely with one another, inflicting serious wounds with their formidable teeth; some were so badly cut up about the head in their frequent quarrels that they were useless for specimens, and eventually I had to put them into separate cages. One night six *Molossus Temminckii* were put in the same cage by mistake, and by morning they were all lying on the floor of the cage nearly dead; the skin of the head was all cut away, and also a place on the back of each. This is the only kind I have met with since the month of December that have been pregnant. One female gave birth to one young on the night of May 11, 1901, and amongst them when caught was one of about a week old. Out of the thirty odd caught there were only two adult males, the rest being all females."—W. F.

In conclusion I may recapitulate the identification of Azara's bats, as thus far determined. All except those in brackets have been verified on topotypes in the Foster collection.

Chauve-souris I. *Artibeus lituratus*.

II. *Vampyrops lineatus*.

III. *Desmodus rotundus*.

IV. *Sturnira lilium*.

V. [*Noctilio leporinus*.]

VI. *Molossus rufus*.

VII. [*Lasiurus cinereus*.]

"El Orejon" of Spanish edition. [*Histiotus velatus*.]

Chauve-souris VIII. *Nyctinomus laticaudatus* (*gracilis* auctorum).

IX. [„ *brasiliensis*.]

X. *Molossus obscurus crassicaudatus*.

XI. [*Myotis* sp. †.]

XII. „ *albescens*.

\* Cf. Ann. Mus. Genov. (2) xx. p. 547 (1900).

† The basis of *Vespertilio ruber*, Geoff. (Ann. Mus. viii. p. 204, 1806). Probably the fawn-coloured species mentioned Ann. & Mag. N. H. (6) xx. p. 214 (1897).



LV.—*Diagnoses of new Fishes discovered by Mr. W. L. S. Loat in the Nile.* By G. A. BOULENGER, F.R.S.

### Mormyridæ.

#### *Petrocephalus Keatingii.*

Depth of body 3 times in total length, length of head 4 to  $4\frac{1}{3}$ . Head as long as deep, rounded; snout very short,  $\frac{1}{4}$  length of head, projecting beyond the mouth, which is situated below anterior border of eye; diameter of eye  $\frac{1}{4}$  length of head; 16 teeth in the upper jaw, 26 in the lower. Dorsal 25, originating above fifteenth ray of anal, its length  $\frac{1}{2}$  its distance from head. Anal 38–39. Pectoral  $\frac{4}{5}$  length of head. Caudal with pointed lobes. Caudal peduncle  $2\frac{1}{2}$  as long as deep,  $\frac{3}{4}$  length of head. 41–44 scales in the lateral line,  $\frac{10}{12-13}$  in a transverse line on the body,  $\frac{13}{8-9}$  in a transverse line between dorsal and anal, 10 round caudal peduncle. Silvery, back and anterior rays of dorsal darker.

Total length 105 millim.

Two specimens from Fashoda.

This species, named in honour of Dr. Keatinge, Director of the Government School of Medicine, Cairo, is intermediate between *P. bane* and *P. Bovei*.

### Cyprinidæ.

#### *Barbus pumilus.*

D. III 8. A. III 5. Sq. 19–20  $\frac{3\frac{1}{2}}{2\frac{1}{2}}$ .

No barbels. Depth of body equal to length of head, 3 times in total length. Snout not prominent, shorter than the eye, which is perfectly lateral and contained 3 times in length of head. Dorsal originating above first ray of ventral, without ossified ray, its upper border concave. Caudal deeply forked. Scales of lateral line series very deep;  $1\frac{1}{2}$  scales between them and the ventral fin; lateral line reduced to three or four tubules on the anterior scales. Yellowish olive above, the scales edged with black, white beneath; a black streak on each side of the head, passing through the eye; a vermilion oblique streak along the dorsal and anal and one or two blackish ones; a blackish vertical streak at the root of the caudal.

Total length 26 millim.

Several specimens from Lake No.

## Siluridæ.

## PHYSAILIA, gen. nov.

Differing from *Ailia*, Gray, in the free air-bladder and the absence of vomerine teeth, from *Parailia*, Blgr., in the presence of a small adipose fin.

*Physailia pellucida*.

Depth of body 4 to  $4\frac{1}{2}$  times in total length, length of head 6 to  $6\frac{1}{2}$  times. Diameter of eye about 3 times in length of head; nasal and maxillary barbels  $\frac{2}{7}$  to  $\frac{1}{3}$  total length, reaching extremity of pectoral fin or a little beyond; mandibular barbels  $\frac{1}{3}$  to  $\frac{2}{5}$  total length. Pectoral as long as head, the spine serrated on the inner side. Anal 65-72, narrowly separated from the caudal, which is deeply forked. Colourless, translucent in life.

Total length 93 millim.

Numerous specimens from Omdurman.

*Ailia somalensis*, Vincig., probably belongs to the same genus, but it differs in the longer barbels and the pectoral spine is described as non-serrated.

## Galaxiidæ.

## CROMERIA, gen. nov.

Body elongate, cobitiform, compressed, naked. Mouth small and inferior, toothless; gill-openings narrow, lateral. Ventrals midway between head and caudal; dorsal and anal short, the former opposite to the space between the latter and the ventrals. Air-bladder slender, elongate, extending along the whole præcaudal part of the body. Vertebrae 30+15.

This remarkable new genus, which I take the liberty of dedicating to Lord Cromer, appears to be most nearly related to *Galaxias*, with which it agrees in the general structure of the vertebral column, the position of the fins, the absence of the mesocoracoid bone, and the naked skin. It differs widely in the small edentulous mouth and the narrow gill-openings.

*Cromeria nilotica*.

Depth of body 8 times in total length, length of head 6 times. Snout rounded, projecting strongly beyond the mouth; diameter of eye about 5 times in length of head. Dorsal and anal with 8 rays, 5 of which are branched. Caudal deeply emarginate. Colourless, except a bright

yellow stripe dotted with black along the dorsal line and the lower edge of the caudal peduncle, and a blackish line along each side of the caudal peduncle.

Total length 30 millim.

Several specimens from Fashoda and Lake No.

### Cyprinodontidæ.

#### *Haplochilus Loati.*

D. 7-8. A. 14-15. Sq. 24-25  $\frac{2\frac{1}{2}}{4}$ .

Depth of body  $4\frac{1}{2}$  to 5 times in total length, length of head 4 to  $4\frac{1}{2}$  times. Eye longer than snout, as long as postorbital part of head. Origin of dorsal above posterior third of anal, twice as far from the eye as from the root of the caudal. Caudal rounded. Yellowish olive above, the scales edged with darker, whitish beneath; fins white, without markings.

Total length 25 millim.

Numerous specimens from Lake No.

Easily distinguished from *H. Marni*, Stdr. (*H. fasciolatus*, Gthr., part.), by the larger scales and the absence of oblique dark bars on the body.

### Gobiidæ.

#### *Eleotris nanus.*

D. V, 10. A. 8. Sq. 29-30.

Body cylindrical or a little compressed, its depth nearly equal to length of head and contained 4 times in total length. Head as broad as deep; snout broad, rounded, as long as the eye, the diameter of which is contained 4 times in length of head; no præopercular spine; maxillary extending to below centre of eye; no canine teeth. Scales strongly ciliated, 9 between origin of second dorsal and anal. Caudal rounded, nearly as long as head. Brownish olive, dotted and marbled with blackish; fins dotted with blackish; vertical dark bars on the sides of the head.

Total length 38 millim.

The first specimen of this species was obtained in a pond left by the Nile in the cataract country about 3 miles north of Kermeh; others were found at Fashoda and at the mouth of Lake No.

LVI.—*Description of a new Silurid Fish of the Genus Anoplopterus, from Cameroon.* By G. A. BOULENGER, F.R.S.

*Anoplopterus longirostris.*

Depth of body 9 times in total length, length of head 4 times. Head longer than broad; eyes small, in the second half of the head, two diameters apart; interocular width  $\frac{2}{3}$  length of snout, which is rounded and projects a little beyond lower jaw; posterior nostril midway between eye and end of snout; maxillary barbel  $\frac{2}{3}$  length of head, reaching root of pectoral; mandibular barbel  $\frac{1}{2}$  length of head. Dorsal I 6, nearer end of snout than root of caudal, first ray  $\frac{2}{3}$  length of head. Adipose short, as long as dorsal. Anal I 5, midway between root of ventral and root of caudal. Pectoral a little longer than ventral,  $\frac{2}{3}$  length of head. Caudal forked. Caudal peduncle  $1\frac{1}{2}$  as long as deep. Dark olive-brown above, mottled with black, white beneath; dorsal, pectorals, and ventrals light, with two transverse series of blackish spots; caudal whitish, with some black spots, black at the base, with a large black blotch on each lobe.

Total length 77 millim.

A single specimen from hills in the Bulu country, some 75 miles in the interior from Batanga, at an altitude of between 1500 and 2000 feet; collected by Mr. G. L. Bates.

This is the third species of the genus *Anoplopterus*, Pfeffer (*Chimarrhoglanis*, Vaillant)\*. The principal distinctive characters of the three species are here given:—

*A. uranoscopus*, Pfeff.—Head more than 5 times in total length; maxillary barbel reaching halfway between head and dorsal fin; adipose fin longer than dorsal; caudal peduncle as deep as long.

*A. platychir*, Gthr.—Head about 4 times in total length; interocular width about  $\frac{2}{3}$  length of snout; maxillary barbel extending to end of head; adipose fin longer than dorsal; caudal peduncle longer than deep.

*A. longirostris*, Blgr.—Head 4 times in total length; interocular width  $\frac{2}{3}$  length of snout; maxillary barbel extending to base of pectoral; adipose fin longer than dorsal; caudal peduncle longer than deep.

With reference to a note published in a recent number of the 'Zoologischer Anzeiger' (xxiv. p. 569), I must repeat

\* Cf. Boulenger, Ann. & Mag. Nat. Hist. (7) i. 1898, p. 254.



the statement made by me in the 'Poissons du Bassin du Congo,' that no representative of the genus *Pimelodus*, in the modern sense, is known from Africa.

The Cameroon *Pimelodus guttatus*, Lönnberg, to which Mr. Poche has alluded, is, to judge by the description of the nostrils, clearly an *Auchenoglanis*, as defined by me, a view in which Dr. Lönnberg informs me he fully concurs.

LVII.—*Some new Genera and Species of Lithobiomorphous Chilopoda.* By R. I. Pocock.

THE genera of Lithobiomorpha which appear to me to be recognizable may be tabulated as follows:—

- |  |   |
|--|---|
| a. No stigmata upon the first leg-bearing somite; more than one ocellus on each side of the head; no completely chitinized "collar" behind the coxæ of the toxicognaths .....                    | <b>Lithobiidæ.</b>                          |
| a <sup>1</sup> . Coxal pores present upon the last five pairs of legs .....  | <i>Pseudolithobius.</i>                     |
| b <sup>1</sup> . Coxal pores present only upon the last four pairs of legs.  |   |
| a <sup>2</sup> . The pores few and uniserial .....   | <i>Lithobius.</i>                           |
| b <sup>2</sup> . The pores many and multiserial .....  | <i>Bothropolys.</i>                         |
| b. A pair of stigmata upon the first leg-bearing somite and a single pair of ocelli on the head; a completely chitinized "collar" behind the coxæ of the toxicognaths (? in Cermatobiidæ).       |   |
| a <sup>3</sup> . Coxal pores present; legs shorter, tarsi of fourteenth pair with not more than six segments; gonopods of ♀ stout; antennæ not funiculate; legs with tibial spike .....          | <b>Henicopidæ.</b>                          |
| a <sup>4</sup> . Coxal pores reduced to one on each side; fifteenth pair of legs much shorter than fourteenth and without protarsal segment ..   | <i>Haasiella.</i>                           |
| b <sup>4</sup> . Coxal pores 3 to 5 in adult; fifteenth pair of legs longer than fourteenth, with distinct tarsal and protarsal segments.  |   |
| a <sup>5</sup> . Tarsi of anterior legs not more than two-jointed.   |   |
| a <sup>6</sup> . Tarsi of anterior legs undivided (legs of fourteenth and fifteenth pairs with tarsus and protarsus undivided) .....   | <i>Lamyctes.</i>                            |
| b <sup>6</sup> . Tarsi, at least of anterior pair of legs, bisegmented (legs of fourteenth and fifteenth pairs unknown) .....  | <i>Paralamyctes.</i>                        |
| b <sup>5</sup> . Tarsi of anterior legs trisegmented, of fourteenth and fifteenth pairs six-jointed. ....  | <i>Henicops.</i>                            |
| b <sup>3</sup> . Coxal pores absent; tarsi long, with not fewer than four segments, those of fourteenth pair many-jointed; no tibial spike; gonopods of female slender; antennæ funiculate ..... | <b>Cermatobiidæ:</b><br><i>Cermatobius.</i> |

## Genus LITHOBIUS.

*Lithobius sculpturatus*, sp. n.

*Colour* yellowish brown, clouded with black; terga paler laterally than in the middle; legs distally yellowish.

*Head* with 6-7 eyes on each side.

*Antennæ* short, with only 20 segments.

*Coxæ* of toxicognaths armed with 4+4 teeth.

*Terga* coarsely granularly rugose, the posterior borders of the ninth, eleventh, and thirteenth straight, those of the tenth, twelfth, and fourteenth shallowly emarginate; none of the posterior angles produced.

*Legs* weakly spined, the tibial spine only present on the anterior pairs; those of last pair armed beneath with 1, 3, 3, 0 short spines, and a short spine on the side of the coxa as well. Coxal pores 3, 4, 4, 4. Claw of anal leg with basal spine.

*Generative forceps* of female with 3+3 spurs and a broad trifold claw; genital appendage of male obsolete. Legs of fifteenth pair unmodified in both sexes.

Length about 11.5 millim.

*Loc.* S. India: Kodeikanal in the Palni Hills and Madras (J. R. Henderson).

This is the first record of the genus *Lithobius* from India.

## Genus HAASIELLA, nov.

This new genus, of which the characters are given above, is erected for the reception of the species from Auckland, New Zealand, described by Haase as "*Henicops insularis*" (Abh. Zool. &c. Mus. Dresden, no. 5, p. 36, pl. iii. fig. 41, 1887).

Apart from the peculiar construction of the fifteenth pair of legs, this genus is interesting for the reduction in the number of coxal pores—a character in which it stands midway between a typical *Henicops* and the genus *Cermatobius*.

## Genus LAMYCTES, Meinert.

*Lamyctes*, Meinert, Nat. Tidsskr. v. p. 266 (1868).

Type *L. fulvicornis*, Mein.

By common consent this genus has been dropped of late years as a synonym of *Henicops*; but I think it may be conveniently retained on the strength of the entirety of the tarsi of the first to the twelfth pairs of legs and the bisegmentation into tarsus and protarsus of those of the thirteenth, fourteenth, and fifteenth pairs.

In addition to the type, *L. fulvicornis*, which is common in *Ann. & Mag. N. Hist.* Ser. 7. Vol. viii.

Europe, the genus contains, amongst others, the following exotic species:—*L. insignis*, Pocock, from Juan Fernandez; *L. tristani*, Poc., from Tristan d'Acunha; *L. albipes*, Poc., from Tjibodas, Java; *L. africanus*, Porat, from Cape Colony; and *L. marginatus*, Newport, from New Zealand.

Genus *PARALAMYCTES*, nov.

Differing from *Lamyctes* in having the tarsal segments of at least the first eleven pairs of legs bisegmented. The presence of 12 coxal teeth on the toxicognaths may also prove to be of generic value.

Type *P. Spenceri*, sp. n.

*Paralamyctes Spenceri*, sp. n.

*Colour*. Castaneous above and obscurely mottled with brown; legs and distal half of the antennæ fulvous; head castaneous, blacker in front.

*Head* convex, smooth and shining.

*Antennæ* short, composed of 20 thickly hirsute cylindrical segments, of which the apical is a little longer than the penultimate.

*Toxicognaths* with the anterior border mesially excised, the margin on each side of the excision being rounded and armed with 6 minute subequal teeth, making a total of 12.

*Tergites* sparsely hirsute, especially at the posterior end of the body, those of the first six somites with rounded angles and straight posterior border; the seventh, eighth, tenth, twelfth, and fourteenth with posterior borders becoming progressively more and more strongly emarginate from before backwards; the ninth, eleventh, and thirteenth strongly emarginate, the angles being acute and much produced.

*Legs* thickly hirsute. Coxal pores 4, 4, 5, 4, rounded and set in a single series. (Posterior legs absent.)

*Generative forceps* furnished with two basal spurs on each side and a single claw.

Length 15 millim.

*Loc*. Durban. A single female specimen (*H. A. Spencer*).

This species may be readily distinguished from *Lamyctes africanus*, Por., by its slightly larger size, the smaller number of its antennal segments, its longitudinally grooved frontal plate, but more especially by its strongly emarginate posterior tergites, and by the presence of twelve small teeth, instead of at most six, on the anterior border of the coxæ of the toxicognaths.

*L. sinuatus*, Porat (Bih. Sv. Vet.-Akad. Handl. xviii.

pt. iv. no. 7, p. 5, 1893), recorded recently from Cape Town, resembles *P. Spenceri* in the emargination of the tergites, but differs in having only six maxillary denticles and as many as thirty-six antennal segments.

### Genus HENICOPS, Newport.

*Henicops*, Newport, Tr. Linn. Soc. xix. p. 372.

Differing from *Lamyctes* in having the tarsi of the legs segmented, those of the anterior thirteen pairs indistinctly, but certainly, trisegmented, those of the fourteenth and fifteenth pairs with the protarsus bisegmented and the tarsus quadrisegmented.

Type *H. maculatus*, Newport.

The genus *Henicops* was based upon two species, *H. maculatus* and *H. emarginatus*. The former may be regarded as the type; the latter, judging by the mutilated type from New Zealand and preserved in the British Museum, being referable to the genus *Lamyctes*.

## LVIII.—*The Chilopoda or Centipedes of the Australian Continent.* By R. I. POCKOCK.

CONSIDERABLE additions have been made to our knowledge of the Australian Centipedes since Haase published his treatise on the subject in 1887. The species known up to the present time are briefly recorded in the following pages, the account of them being intended rather as a "student's guide" to the subject than as a complete monograph.

### Order SCUTIGEROMORPHA.

Genus SCUTIGERA, Lamarck.

*Scutigera maculata* (Newport).

*Cermatia maculata*, Newport, Ann. & Mag. Nat. Hist. xiii. p. 96 (1844); id. Tr. Linn. Soc. xix. p. 359 (1845).

*Cermatia australiana*, Newport, loc. cit.

*Scutigera maculata*, Meinert, Vid. Medd. 1886, p. 103; Haase, Abh. Mus. Dresden, v. p. 23 (1887).

? *Cermatia Latreillei*, Newport, Ann. & Mag. Nat. Hist. xix. pp. 359, 845.

This prettily marked species appears to be the only member of the genus met with in Southern Australia. Newport's specimens were from the Swan River, and Haase has recorded examples from Peak Downs.



The British Museum also has examples from the following localities, which attest the wide range of the species :—Perth (*H. W. J. Turner*) ; Narre Warren, Loch, Walhalla, Warragul (*Prof. Baldwin Spencer*), and Warburton (*H. R. Hogg*), in Victoria ; New South Wales (*J. Macpherson*) ; South Queensland (*Prof. B. Spencer*).

The description of *Scutigera simplex*, Haase (*Abh. Mus. Dresden*, no. 5, p. 26, 1887), is probably based upon a specimen conspecific with those above referred to *S. maculata*. The locality is given as Adelaide.

Haase also recognizes the following as a valid species :—*Scutigera Lesueurii* (Lucas, *Anim. Artic. Crust. &c.* p. 538, 1840 ; Gervais, *Ins. Apt.* iv. p. 223, 1847), with which *S. strabo*, Wood (*Journ. Ac. Sci. Philad.* (2) v. p. 11, 1863), is given as synonymous. Gervais describes the type, which is vaguely ticketed "New Holland," as "brown, with a paler median dorsal band and yellow legs and antennæ." The specimen from Rockhampton identified by Haase as this species, and the type of *S. strabo* from Oahu, must be considered doubtfully identical with *Lesueurii*. If the description of the latter is taken from a specimen showing the colours of life, no doubt *S. Lesueurii* is a species distinct from *S. maculata*, which has the legs banded and an irregular pale dorsal longitudinal stripe on each side of the middle line.

*Scutigera Latreillei*, Newport (*Tr. Linn. Soc.* xix. p. 357), labelled "New Holland," may be nothing but a dark form of *S. maculata*. The prevailing colour of the dried type in the Hope Museum at Oxford is black, with the stomata orange-yellow, some spots of the same colour on the head, and the legs banded with black. Haase considers *S. violacea*, L. Koch (*Verh. zool.-bot. Ges. Wien*, xv. p. 890, 1865), from Wollongong, to be identical with *S. Latreillei*, on the strength of the black colour of the dorsal plates and the presence of a pair of reddish-brown spots on the hinder border of each. At present, however, we have not sufficient material to unravel the difficult questions of synonymy here involved.

### Order LITHOBIOMORPHA.

The three genera of this order may be diagnosed as follows :—

- a. A single eye on each side of the head and a pair of stigmata on the first leg-bearing somite.
- a<sup>1</sup>. Tarsi of anterior legs three-segmented, of fourteenth and fifteenth pairs six-segmented ..... *Henicops*.

- b*<sup>1</sup>. Tarsi of anterior legs undivided, of fourteenth and fifteenth pairs bisegmented, *i. e.* with tarsal and pro-tarsal segments ..... *Lamyctes* \*.
- b*. A cluster of ocelli on each side of the head; no stigmata on the first leg-bearing somite ..... *Lithobius*.

# Genus HENICOPS.

## *Henicops maculatus*, Newport.

*Henicops maculatus*, Newport, *op. cit.* p. 372, pl. xxxiii. fig. 27, and pl. xl. fig. 3.

♀. *Colour* yellowish brown, with an indistinct median dorsal dark stripe.

*Antennæ* long, composed of 37 segments.

*Coxæ* of toxicognath with præcoxal processes broad, convex, and armed with 3 + 3 teeth.

The posterior *terga* sparsely bristly; the anterior with rounded angles and scarcely emarginate posterior borders; the posterior borders becoming gradually more and more emarginate from before backwards, those of the minor tergites more deeply so than of the major, the emargination perfectly evenly convex.

*Legs* long, hairy, and beset with short spinules; the tarsi with 2 + 2 spinules beneath, set at the distal end of the sub-segments. Coxal pores small, 4, 5, 5, 5; gonopods of female with 2 short spurs and a simple claw.

Total length 15 millim.; length of antennæ 8, of posterior leg 9.

*Loc.* Tasmania; also Australia and New Zealand.

The above-given description is taken from a specimen from Wellington, New Zealand (*H.M.S. 'Challenger'*), which is apparently conspecific with the type originally recorded from Tasmania. The British Museum also has damaged specimens of apparently the same species from Tasmania and from Fern Tree Gully, Wood's Point Road, and Loch in Gippsland, Victoria, presented by Prof. Baldwin Spencer, F.R.S. Some of these specimens are mottled with black spots, two of them have 44 antennal segments, and one of them 4-5 coxal teeth; but the material is not sufficient to justify the separation of the Australian from the Tasmanian or New Zealand type.

*Henicops impressus*, Hutton (Tr. N. Z. Inst. x. p. 288,

\* *Lamyctes* is represented in New Zealand by *L. emarginatus*, Newport. The genus will probably turn up in Australia, seeing that it occurs both in S. Africa, S. America, Sumatra, &c., and Europe, as well as in New Zealand.

1807), from Dunedin and Queenstown, probably belongs to the same genus as *H. maculatus*. It is not, however, possible from the description to settle the point.

*Henicops dentatus*, sp. n.

Closely allied to the preceding species, but with the legs more spiny, the tarsi being armed beneath with five pairs of spines and the emargination of the terga deeper. Moreover, the seventh, ninth, eleventh, and thirteenth terga are sub-quadrately and not evenly and convexly emarginate. Antennæ and posterior legs fractured; the former, however, had at least 30 segments.

Total length 15 millim.

Loc. W. Australia, Perth (*H. W. J. Turner*).

Genus LITHOBIUS, Leach.

*Lithobius sydneyensis*, Pocock.

*Lithobius sydneyensis*, Pocock, Ann. & Mag. Nat. Hist. viii. p. 153 (1891).

Loc. Sydney (*J. Brazier*).

Order SCOLOPENDROMORPHA.

*Synopsis of the Genera.*

- a. Without eyes ..... *Cryptops*.
- b. With four eyes on each side of the head.
  - a<sup>1</sup>. Seventh somite with a pair of stigmata.
    - a<sup>2</sup>. Stigmata very large, "sieve-like"; no tooth on femur of toxicognaths ..... *Ethmostigmus*.
    - b<sup>2</sup>. Stigmata small; a tooth on femur of toxicognaths ..... *Rhysida*.
  - b<sup>1</sup>. Seventh somite without stigmata.
    - a<sup>3</sup>. Head not overlapping the first tergite.
      - a<sup>4</sup>. A pair of sclerites on the posterior-lateral angles of the head ..... *Cormocephalus*.
      - b<sup>4</sup>. No sclerites on the posterior-lateral angles of the head ..... *Otostigmus*.
    - b<sup>3</sup>. Head overlapping the first tergite ..... *Rhombcephalus*.

Genus RHOMBOCEPHALUS \*, Newp.

*Rhombcephalus lætus* (Haase).

*Scolopendra læta*, Haase, Abh. Mus. Dresden, no. 5, p. 51, pl. iii. fig. 51 (1887).

*Colour*. Head and terga deep green, the latter with a longi-

\* I restrict the term *Scolopendra* to the species with the first tergite sulcate. The type of *Rhombcephalus* is *ungulatus*, Latr.

tudinal lateral yellow stripe lying midway between the lateral border and the sulcus, the margin of each tergum and the upper portion of the pleural membrane being green; sometimes this yellow stripe is broad and extends right to the margin, in which case there is no green on the pleura; at other times the median green stripe spreads laterally and almost obliterates the yellow, and it is always a little wider than the space between the furrows; it begins either upon the second or first tergum; the latter, however, is, like the head, generally uniformly deep green; antennæ green, indistinctly banded with yellow basally; toxicognaths, legs, and sternum reddish or greenish yellow; anal legs prettily banded with green and yellow, being green with a broad transverse yellow band on the basal half of each segment.

In structural features this species resembles the form that passes as *R. morsicans* of Linnæus, of which it is, perhaps, a descendant, modified since artificial introduction into Australia, where it appears to be the only indigenous species of the genus *Rhombcephalus*.

Total length up to 56 millim.

*Loc.* Perth (*H. W. J. Turner*); New South Wales (*W. W. Froggatt*). Haase's specimen was recorded as doubtfully from Adelaide.

The two New South Wales specimens have the yellow bands broader and more sharply defined than in the examples from Perth. More material, however, must be examined before the question as to the racial value of this feature can be established.

### Genus CORMOCEPHALUS, Newp.

Representatives of this genus are the prevalent forms of Scolopendroids met with in South Australia. The genus occurs also in New Zealand and other islands adjacent to Australia, in Madagascar, in South Africa (where it is abundant), with a few outlying species in Ceylon and India.

The Australian species fall into two sections. The first, typified by *C. aurantiipes*, has three spines in a single series on the outer side of the under surface of the femur of the anal leg, whereas in the second, typified by *Westwoodii*, the spines in question are four in number and biserial.

### *Cormocephalus aurantiipes*, Newp.

*Scolopendra aurantiipes*, Newport, Ann. & Mag. Nat. Hist. xiii. p. 99 (1844).

*Cormocephalus aurantiipes*, Newp. Tr. Linn. Soc. xix. p. 421 (1845).

*Cormocephalus obscurus*, id. ibid.



*Cormocephalus subminiatus*, Newp. Ann. & Mag. Nat. Hist. xiii. p. 100 ; id. Tr. Linn. Soc. xix. p. 423 (1845).

*Cormocephalus miniatus*, id. *ibid.*

*Cormocephalus aurantiipes*, *aurantiipes* var. *obscurus*, and *subminiatus*, Haase, Abh. Mus. Dresden, no. 5, pp. 57-62 (1887) (where other synonyms may be found).

The types of Newport's species cited above, namely *aurantiipes* from the Swan River \*, *obscurus* from Sydney, *miniatus* from Adelaide, and *subminiatus* from the Swan River, are preserved in the British Museum and are, I believe, specifically identical.

Moreover, according to Haase, *C. gracilis*, Kohlrausch, from Gayndah, is based upon the young of this species, and *C. marginatus*, Porat, from Sydney, upon a variety without median sulcus on the anal tergum ; also Meinert's type of *exiguus* from Brisbane was referred by Haase to the species he identified as *subminiatus*, Newp., of which he had seen examples from Adelaide.

In addition to the types of Newport's species above referred to, the British Museum has specimens from South Queensland (*B. Spencer*) ; Bendigo in Victoria and Sydney (*W. Froggatt*) ; Queensland (*J. Macpherson*), and New South Wales ; Melbourne (*Degen*) ; Mt. Lofty (*B. Spencer*) ; Perth (*Turner*) and the Darling Range (*B. H. Woodward*) ; and Toowoomba.

Haase separated *subminiatus* from this species on the strength, as he believed, of its having thinner and more strongly spined anal legs ; but this feature, like the presence or absence of a sulcus on the anal tergite, appears to be quite inconstant, the sulcus being sometimes strong, sometimes faint, and sometimes absent, irrespective of locality.

Hence I find it impossible to maintain *obscurus* as a sub-species or variety.

Another variety instituted by Haase has from 11-14, instead of 9, spines on the anal femora. The specimens exhibiting this abnormality were from Adelaide.

Judging from dried and alcohol-preserved material, the colour in this species varies from a uniform chestnut to olive-brown or green, with dark green bands across the terga, deep bluish-green antennæ, red head and anal somite. The last is, I suspect, the true colour of the species.

### *Cormocephalus Turneri*, sp. n.

♂ (adult). Prevailing colour greenish, with the anal somite and legs paler. Head more convex than in *C. aurantiipes* ;

\* Not Port Essington, as Newport asserts.

antennæ short, not reaching beyond the second tergite, with 17 segments. Anal tergum without trace of median groove, more convex than in *C. aurantiipes*; anal legs very short and thick, the femur with a much stronger basal notch than in *C. aurantiipes*, only about one fourth longer than wide, its width equal to the length of the third segment, typically armed with 2, 1, 2, 2 spines.

♀. Anal legs much thinner; femur armed with 2, 2, 2, 2 or 3 spines, at least twice as long as wide, and much narrower than the length of the third segment.

Total length 55 millim.; anal leg 9.5; antennæ 8.5; length of head 4.

*Loc.* Perth (*H. W. J. Turner*).

In most respects this species resembles *C. distinguendus* of Haase, but the latter is said to have no spines beneath the claw on the anal leg. The only known specimen was from Adelaide (*Abh. Mus. Dresden*, no. 5, p. 61, pl. iv. fig. 61, 1887).

### *Cormocephalus Westwoodii*, Newp.

*Cormocephalus Westwoodii*, Newport, *Ann. & Mag. Nat. Hist.* xiii. p. 100 (1844); *id.* *Tr. Linn. Soc.* xix. p. 422 (1845); Kohlrausch, *Arch. Nat.* xlvii. p. 85 (1881); Haase, *Abh. Mus. Dresden*, no. 5, p. 62 (1887).

*Cormocephalus fæcundus*, Newport, *Tr. Linn. Soc.* xix. p. 421 (1844).

*Cormocephalus pallipes*, Newport, *loc. cit.* p. 424.

*Cormocephalus monilicornis*, Porat, *Bih. Sv. Vet.-Akad. Handl.* iv. no. vii. p. 16 (1876) (sec. Haase).

*Cormocephalus rugulosus*, *id.* *ibid.* (sec. Haase).

*Cormocephalus lanatipes*, Kohl. *Arch. f. Naturg.* xlvii. p. 85 (1881) (sec. Haase).

This species is apparently confined more to the eastern parts of Australia than *C. aurantiipes*. The type of *C. Westwoodii* is ticketed merely "Australia"; other specimens named by Newport were from near Sydney; the types of *fæcundus* from Parramatta, and of *pallipes* from Van Diemen's Land. The type of *rugulosus* of Porat was also from Sydney. According to Haase the form he identified as *fæcundus* has been obtained at Twofold Bay in New South Wales and at Elphinstone, and the typical *Westwoodii* at Gayndah and Peak Downs in Queensland and at Elphinstone.

In addition to Newport's specimen, the British Museum has examples from Sydney and Parramatta, as well as from localities near these last, *e.g.* Ashfield, Bondi, Rose Bay, &c. on the Parramatta River (*J. Macpherson*), from Fern Tree Gully in Victoria (*Prof. Baldwin Spencer*), and from Tasmania and Mt. Rumsay, Hobart (*E. M. Thomson*).

Haase separated *fæcundus* from *Westwoodii* on the strength

of a greater thickness of the anal legs in the former; but this seems to be a feature subject to variation. In well-preserved examples the colour of this species is much like that of *C. aurantiipes*, the anterior and posterior extremities being blood-red, the antennæ bluish, and the body greenish with darker bands. No trace of this coloration is observable in many dried or alcohol-preserved specimens.

*Cormocephalus esulcatus*, sp. n.

Closely related to *C. Westwoodii*, but differing in a character which appears to be constant, namely, the entire absence of a median sulcus on the anal tergite; this plate also is not so wide and transversely oblong as in that species, being distinctly narrower posteriorly than across the middle, with its sides convex; the anal legs, too, are much weaker than in the adults of *C. Westwoodii* and the young of corresponding size. The prevailing colour is greenish or olive-brown, with bluish antennæ and greenish legs.

Length up to 56 millim.; length of head 3, of antenna 8, of anal leg 8.5.

*Loc.* Fern Tree Gully in Victoria (*Prof. Baldwin Spencer*).

It is interesting to observe that both this species and *C. Westwoodii* are found in Fern Tree Gully, where the two were taken together by Prof. Baldwin Spencer. The specimens of *Westwoodii* may be immediately recognized by their coloration, the tergites being paler, more distinctly banded, and the head and anal legs redder than in those of *C. esulcatus*.

Genus OTOSTIGMUS, Porat.

*Otostigmus tuberculatus* (Kohl.).

*Branchiotrema tuberculatum*, Kohlrausch, Journ. Mus. Godeff. 1878, pt. 14, p. 71, pl. vi. fig. 4 (1878); id. Arch. Naturg. xlvii. p. 74, pl. v. fig. 11 (1881).

*Otostigma tuberculatum*, Haase, Abh. Mus. Dresden, no. 5, p. 76, pl. iv. fig. 79 (1887).

Slender in front, expanded behind. Olive-green in colour, with the terga laterally ferruginous; legs ferruginous, the posterior pairs banded with green. Antennæ 18-jointed. Præcoxal plates of toxicognaths with 3+3 teeth. Terga from the fifth sulcate, from the ninth marginate; subrugulose, the last rough. Sterna shining, from the ninth tubercular; the last smooth. Anal pleuræ long, acute, apically trispinose, and with one upper and two lateral large spines. Legs of twentieth pair with protarsal spine, of twenty-first pair

slender, the femur armed with 4, 2, 3, 6 spines, the protarsus unspined.

Length 38 millim., of anal leg 12 millim.

Loc. Rockhampton.

Genus RHYSIDA, Wood.

*Rhysida carinulata*, subsp. *australica* (Haase).

*Branchiostoma carinulata*, subsp. *australica*, Haase, Abh. Mus. Dresden, no. 8, pp. 82-83 (1887).

Loc. Cape York.

*Rhysida longipes* (Newport).

*Branchiostoma longipes*, Newport, Tr. Linn. Soc. xix. p. 411 (1845); Haase, Abh. Mus. Dresden, no. 5, p. 83, pl. vi. fig. 86 (for synonymy).

Loc. Melbourne (according to Haase).

Widely distributed in the tropics of the eastern and western hemispheres.

*Rhysida nuda* (Newport).

*Branchiostoma nudum*, Newport, Tr. Linn. Soc. xix. p. 412 (1845); Haase, Abh. Mus. Dresden, no. 5, p. 84, pl. v. fig. 88 (1887).

Loc. Parramatta, Port Mackay, Bowen, Brisbane, and Elphinstone.

Key to the Species of Rhysida.

- a. Terga with finely toothed keels; anal pleuræ with 5 spines. *australica*.
- b. Terga without keels; anal pleuræ with four spines.
  - a<sup>1</sup>. Antennæ with 18 segments; three rows of spines on the femora of anal legs ..... *longipes*.
  - b<sup>1</sup>. Antennæ with 21 segments; anal femora weakly spined ..... *nuda*.

Genus ETHMOSTIGMUS, Poc.

(= *Heterostoma*, Newp., and *Dacetum*, Koch, preoccupied, the latter as *Daceton*.)

*Ethmostigmus rubripes* (Brandt).

*Scolopendra rubripes*, Brandt, Recueil &c. p. 65 (1840).

*Heterostoma sulcidens*, *squalidens*, *scabriventris*, *sulcicornis*, *megacephala*, Newport, Ann. & Mag. Nat. Hist. xiii. p. 99 (1844), and Tr. Linn. Soc. xix. pp. 416-417; *fasciata* and *flava*, id. op. cit. pp. 415-417.

*Heterostoma rubripes*, Haase, Abh. Mus. Dresden, no. 5, p. 89 (1887).

This, the largest Australian Centipede, is also wide-ranging. Newport's types of *sulcidens*, *squalidens*, and *scabriventris* were from Parramatta; those of *megacephala* and *sulcicornis* from Port Essington; and of *flava* from the Swan River.



The British Museum also has examples from Adelaide, Sydney, Parramatta (*J. Macpherson*) ; Cooran, in Queensland (*Prof. Baldwin Spencer*) ; Cape York and some of the Australian islands—Fitzroy Island, Baudin Island, &c. From Australia the species is said to extend in a north-westerly direction as far as Java.

The colour varies considerably and perhaps in accordance with locality. *Prof. Baldwin Spencer's* examples from Cooran all belong to the *fasciata* type, being remarkably yellow, with a narrow transverse stripe on the posterior border of the terga, whereas in examples from New South Wales (Sydney) and Adelaide the green, especially at the anterior end of the body, predominates. In some cases the terga and head are quite green.

### Genus CRYPTOPS, Leach.

#### *Cryptops sulcata*, Haase.

*Cryptops australis*, Kohlrausch, Arch. Naturg. xlvii. p. 127, pl. v. figs. 21, 22 (1881) (not *australis*, Newp.).

*Cryptops sulcata*, Haase, Abh. Mus. Dresden, no. 5, p. 80, pl. v. fig. 83 (1887).

Loc. Rockhampton.

#### *Cryptops spinipes*, Pocock.

*Cryptops spinipes*, Pocock, Ann. & Mag. Nat. Hist. viii. p. 156 (1891).

Loc. Sydney (*J. Brazier*).

This species at least differs from *C. sulcatus*, which is unknown to me, in having the first and second tergites devoid of longitudinal sulci.

## Order GEOPHILOMORPHA.

### Key to the Australian Genera.

- a. Basal plate broad, quite covering the pleuræ of the toxicognaths at the sides ; a row of pleural scutes above the stigmata ..... *Orphnæus*.
- b. Basal plate narrow ; the pleuræ of the toxicognaths not covered from above.
  - a<sup>1</sup>. Upper edges of the pleuræ of the toxicognaths forming a sharp ridge on each side of the very narrow basal plate ..... *Mecistocephalus*.
  - b<sup>1</sup>. Upper edges of the pleuræ not forming a ridge on each side of the basal plate ..... *Necrophléophagus*.

### Genus MECISTOCEPHALUS, Newp.

#### *Mecistocephalus tahitiensis*, Wood.

*Mecistocephalus tahitiensis*, Wood, Journ. Acad. Nat. Sci. Philad. (2) v. p. 43 (1863) ; Haase, Abh. Mus. Dresden, no. 5, p. 101 (1887), pl. vi. fig. 108 (1887).

With 47 pairs of legs and only about 12 pores on the anal pleuræ.

*Loc.* Gayndah and Rockhampton (according to Haase); also Olinda, Viti, and Otaïiti.

Genus NECROPHLÆOPHAGUS, Newp., emend. Pocock.

*Necrophlæophagus concolor* (Gervais).

*Geophilus concolor*, Gervais, Ins. Apt. iv. p. 320 (1847); Haase, Abh. Mus. Dresden, no. 5, p. 108, pl. vi. fig. 113 (1887).

Widely distributed in Australia. Gervais's type was from Port Jackson; Haase records specimens from Rockhampton and Sydney. The British Museum has examples from New England in New South Wales (*J. Macpherson*) and Perth (*H. W. J. Turner*).

This species may be at once recognized from *G. antipodum* by its strongly hirsute head, antennæ, and legs, very long antennæ, of which some of the segments are nearly or quite three times as long as wide, by the strong and thick punctuation of the head and toxicognaths, the fewer pores on the anal pleuræ, broader sternites, &c., and lastly by the number of pairs of legs attaining 69 or 71.

Length up to 48 millim.

*Necrophlæophagus antipodum* (Pocock).

*Geophilus antipodum*, Pocock, Ann. & Mag. Nat. Hist. viii. p. 222, pl. xii. fig. 8 (1891).

*Loc.* Fern Tree Gully, in Victoria (*Prof. Baldwin Spencer*).

This species has previously been recorded only from Maungatua and Wellington in New Zealand. Its occurrence in Australia is of much interest.

*Necrophlæophagus sydneyensis* (Pocock).

*Geophilus sydneyensis*, Pocock, Ann. & Mag. Nat. Hist. viii. p. 219 (1891).

A small species based upon examples from Inner Double Bay, Port Jackson (*J. Brazier*).

*Necrophlæophagus opinatus* (Newport).

*Arthronomalus opinatus*, Newport, Tr. Linn. Soc. xix. p. 433 (1845).

*Geophilus opinatus*, Haase, Abh. Mus. Dresden, no. 5, p. 108 (1887).

*Colour* deep ochre-yellow, darker anteriorly.

*Head-plate* a little longer than wide, narrowed in front, with lightly convex margins, sparsely punctured, and with two shallow longitudinal impressions; frontal sulcus obsolete.

*Antennæ* clothed with short hairs, the segments subcylindrical, mostly about twice as long as wide.

*Basal plate* almost as wide as the first tergite posteriorly, narrowed anteriorly to the width of the head.

*Toxicognath* largely overlapping the head laterally; coxal plate with median groove, complete chitinous lines, narrowed laterally, not parallel-sided; femur short, wider than long, unarmed; a small tooth at base of fang; when the fangs are folded the toxicognaths are about as wide as long.

*Terga* smooth, shallowly bisulcate, the anterior with a faint median sulcus as well. Anterior twenty-five *sterna* with an anterior median pit, which is deep from the second to about the twelfth somite, then gradually fades away; posterior *sterna* shortly hirsute, the hairs giving the appearance of granulation. Last somite as wide as the penultimate; the pleuræ largely visible at the sides of the tergal and prætergal plates, furnished above, below, and laterally with about 30 pores; the tergite a little longer than wide; the sternite small, triangular, much narrower in front than one of the pleural plates and not half the length. 69 pairs of legs.

Posterior *legs* scarcely longer than penultimate, slender, the segments progressively becoming thinner and longer distally; claw large.

*Gonopods* represented by a pair of triangular bisegmented lobes.

*Anal pores* large.

Total length 54 millim.

*Loc.* Narre Warren, Gippsland.

The above-given description is taken from a specimen sent to the British Museum by Prof. Baldwin Spencer.

The two specimens, ticketed "Australia," upon which Newport based his description are imperfect in the case of the antennæ and of the posterior end of the body. The latter imperfection was overlooked by Newport, who gives the number of pairs of legs as 52 and 54 (the actual numbers are 50 and 53). In reality, as the example from Narre Warren indicates, the species possesses at least as many as 69. Haase, in his monograph, falls into the error of assigning 49 pairs to the species\*.

\* I take this opportunity of characterizing a new species of the genus closely related to *N. opinatus* :—

*Necrophlæophagus Spenceri*, sp. n.

Closely allied in most structural points to *G. opinatus*, but with only 39 pairs of legs and the pleuræ less inflated, their anterior portion being covered on the dorsal side by the prætergal sclerite of this

*Necrophlœophagus laticeps* (Pocock).

*Geophilus laticeps*, Pocock, Ann. & Mag. Nat. Hist. viii. p. 220, pl. xii. figs. 6, 6 a (1891).

Loc. King's Island, in Bass Strait (*Arthur Dendy*).

*Key to the Australian Species of Necrophlœophagus.*

- a. Head long and narrow; toxicognaths largely overlapping it laterally and partially so in front, with large quadrate coxal plate, which has no sutural lines and long subcylindrical femur.
  - a<sup>1</sup>. Pairs of legs 39 in number..... *antipodum*, Poc.
  - b<sup>1</sup>. Pairs of legs about 70 in number.
    - a<sup>2</sup>. Anal legs composed of 5 segments; the pleuræ with many pores above and below.. *curtipes*, Haase.
    - b<sup>2</sup>. Anal leg with 6 segments; the pleuræ with only a few pores below..... *concolor*, Gerv.
- b. Head short and broader; the toxicognaths not overlapping it in front; the coxal plate not large and quadrate, with distinct sutural line; femur short, especially along its inner edge.
  - a<sup>3</sup>. Anal pleuræ with many pores; anal sternum very small and triangular; toxicognaths largely overlapping the head-plate at the sides..... *opinatus*, Newp.
  - b<sup>3</sup>. Anal pleuræ without pores, small; anal sternum large; head-plate almost entirely overlapping the toxicognaths at the sides.
    - a<sup>4</sup>. With 59 pairs of legs; anterior sterna with a deep oval pit; basal plate wide and short, four times as wide as long..... *laticeps*, Poc.
    - b<sup>4</sup>. With 43 pairs of legs; anterior sterna without distinct oval impression in front; basal plate not four times as wide as long..... *sydneyensis*, Poc.

Genus ORPHNÆUS, Meinert.

*Orphnæus phosphoreus* (Linn.).

*Scolopendra phosphorea*, Linn. Syst. Nat. ed. x. p. 368 (1758).

*Geophilus brevilabiatus*, Newport, Tr. Linn. Soc. xix. p. 436 (1845).

*Orphnæus brevilabiatus*, Meinert, Haase, &c.

Loc. Perth (*H. W. J. Turner*).

Widely distributed in the tropics.

somite; the pores, moreover, of which about twenty are visible, are considerably larger, those lying near the genital border of the pleura being less than their own diameter from this edge; sternite wider, less narrowed, its posterior width about half its anterior width, which exceeds the width of the pleura adjacent to it externally.

Total length 19 millim.

Loc. The Bluff, South Island, New Zealand (*Baldwin Spencer*).



LIX.—*Rhynchotal Notes*.—XI. Heteroptera: *Fam. Lygæidæ*.  
By W. L. DISTANT.

THIS communication completes the revision of the family Lygæidæ as contained in the collection of the British Museum, and gives the result of an examination of Walker's species published in part v. of his Catalogue of Hemiptera Heteroptera. A number of new genera and species belonging to the National and my own collection are also described.

LYGÆINÆ (continued).

Genus LYGÆUS.

*Lygæus discifer*.

*Rhyparochromus discifer*, Walk. Cat. Het. v. p. 92. n. 118 (1872).

A species allied to *L. dispar*, Stål, and *L. cinctipennis*, Stål.

Apical joint of antennæ brown, apex of first joint narrowly and obscurely ochraceous; coxæ luteous; disk of abdomen ochraceous (carded specimen).

Genus LYGÆOSOMA.

*Lygæosoma neglecta*, sp. n.

Head and antennæ black; pronotum and scutellum pale piceous, coarsely punctate; a central longitudinal fascia to pronotum and the apex of the scutellum ochraceous; corium pale reddish, the veins and extreme base paler in hue; membrane black, its apex greyish white; body beneath black; legs dark castaneous.

Body finely pilose above, more longly pilose beneath.

Long.  $3\frac{1}{2}$  millim.

*Hab.* Cape of Good Hope (*Rev. A. E. Eaton*, Brit. Mus.).

*Lygæosoma tripunctata*.

*Aphanus tripunctatus*, Dallas, List Hem. ii. p. 559 (1852).

Genus MELANOTELUS.

*Melanotelus rubiginosus*.

*Rhyparochromus rubiginosus*, Walk. Cat. Het. v. p. 110. n. 192 (1872).

The Victorian specimen standing as the type of this species does not agree with the description, but, on the contrary, can scarcely be separated from *M. bipunctatus*, Dall., and

may be only a very slight variety of that species. It is quite probable that Walker intended this for his type and inadvertently described something else. He had done it before!

### Genus *NYSIUS*.

#### *Nysius spectabilis*, sp. n.

Head, pronotum, and scutellum black; antennæ, anterior margin, posterior half of lateral margins, and a large irregular discal spot to pronotum ochraceous; corium and membrane greyish white; apex of clavus, two somewhat large spots on posterior margin of corium—one at inner angle, the other about centre,—and a small spot at apical angle black; body beneath black; legs, central area of abdomen, anterior margin and lateral angles of prosternum, lateral margins of meso- and metasterna, posterior margin of metasternum, and coxal spots ochraceous.

Pronotum very coarsely punctate with a central impression; fourth joint of antennæ about as long as third joint and moderately incrassate, its apex slightly fuscous.

Long. 4 millim.

*Hab.* Christmas Island (*C. W. Andrews*, Brit. Mus.).

### *CYMINÆ*.

### Genus *NINUS*.

#### *Ninus assamensis*, sp. n.

Head piceous, greyishly pubescent, especially at apex; antennæ pale chocolate-brown, finely pilose; pronotum greyish, darkly punctate; two small rounded spots near anterior margin and two very large basal spots—narrowly inwardly divided and anteriorly emarginate—chocolate-brown, between the two series of spots are two transverse black lines; scutellum greyish, darkly punctate, somewhat blackish on lateral margins; corium pale greyish ochraceous, brownly punctate, the lateral margin pale impunctate, a piceous patch at inner angle, a black spot at apex; clavus chocolate-brown; membrane pale brownish ochraceous, its ventral area dark brown, reflecting the abdomen beneath.

Head beneath and sternum dull greyish, darkly punctate; abdomen piceous, greyishly pilose; legs and rostrum brownish ochraceous, the last with its apex piceous.

Long. 4 millim.

*Hab.* Assam: Margherita.

Allied to the Neotropical *N. notabilis*, Dist.

*Ann. & Mag. N. Hist.* Ser 7. Vol. viii.

*Ninus discessus*, sp. n.

Dull ochraceous; head, apical joint of antennæ, anterior area of pronotum, scutellum, and clavus much darker in hue; a longitudinal spot on each side of the posterior disk of pronotum piceous; apex of scutellum greyish; corium semihyaline, margins of clavus and corium ochraceous; two minute spots at claval apex, a small spot about centre of lateral margins, and the apical angle piceous; membrane pale ochraceous hyaline; head and sternum beneath brownish; abdomen and legs ochraceous; rostrum ochraceous, with its apex pitchy.

Long. 4 millim.

*Hab.* Assam: Margherita.

## Genus ISCHNORHYNCHUS.

*Ischnorhynchus lineolus*.

*Cymus lineola*, Dall. List Hem. ii. p. 587 (1852).

## BLISSINÆ.

## Genus SPALACOCORIS.

*Spalacocoris sulcatus*.

*Ischnodemus sulcatus*, Walk. Cat. Het. v. p. 133. n. 33 (1872).

*Spalacocoris sulcifer*, Stål, En. Hem. iv. p. 130 (1874).

## Genus CHELOCHIRUS.

*Chelochirus talpa*.

*Ischnodemus talpa*, Walk. Cat. Het. v. p. 133. n. 34 (1872).

## Genus MACROPES.

*Macropes spinimanus*

*Macropes spinimanus*, Motsch. Etud. viii. p. 108 (1859).

*Ischnodemus centralis*, Walk. Cat. Het. v. p. 132. n. 31 (1872).

*Macropes varipennis*.

*Ischnodemus varipennis*, Walk. Cat. Het. v. p. 131. n. 30 (1872).

Abdomen above and beneath castaneous. This important character is not mentioned in Walker's very loose description. It is thus very probable that the *M. annamita*, Bergr. (Rev. Ent. Fr. xiii. p. 155, 1894), is only a varietal form of *M. varipennis*.

*Macropes punctatus*.

*Ischnodemus punctatus*, Walk. Cat. Het. v. p. 132. n. 32 (1872).

*Macropes divisus*.

*Ischnodemus divisus*, Walk. Cat. Het. v. p. 134. n. 35 (1872).

*Macropes sultanus*, sp. n.

Black; tarsi brownish, margin of corium near base obscurely rufous.

Pronotum very thickly and coarsely punctate, the posterior and subanterior areas very slightly punctate, its base very strongly concavely sinuate; scutellum coarsely punctate, with a raised base and central line, the first with a few coarse punctures; membrane extending to about the fifth abdominal segment, its basal area somewhat greyish; the tarsi and the apices of the posterior tibiæ brownish; antennæ with the second and fourth joints subequal in length and longer than the third joint.

Long. 9 millim.

*Hab.* Zanzibar (Brit. Mus.).

*Macropes dilutus*, sp. n.

Head, pronotum, sternum, and femora very dark castaneous; antennæ, tibiæ, and abdomen above and beneath pale castaneous; corium pale creamy white; base of scutellum, claval margins, apex of corium, and the membrane very dark castaneous; membrane with the inner angle, a marginal spot, and the apex creamy white; tarsi and antennæ ochraceous.

Pronotum with a distinct, central, transverse impression, the anterior lobe with the disk somewhat flatly gibbous, its posterior margin moderately concave, apex of membrane extending beyond the fourth abdominal segment.

Long. 7 millim.

*Hab.* North India (*sic*).

A species allied to *M. punctatus*, Walk.

*Macropes excuratus*, sp. n.

Head, pronotum, scutellum, abdomen above, and body beneath black; legs and antennæ ochraceous; corium pale ochraceous, with the claval margins and venation somewhat darker; membrane piceous, basal angle, a spot on each lateral margin, and the apex creamy white.

Membrane just passing the fourth abdominal segment.

Long. 6 millim.

*Hab.* India: Shillong.



*Macropes fasciatus*, sp. n.

Head, antennæ, rostrum, pronotum, and corium piceous ; body beneath and legs castaneous ; membrane and the tarsi ochraceous ; membrane with a broad, transverse, discal piceous fascia.

Antennæ robust, first and third joints shortest ; pronotum with a broad, central, transverse impression which is strongly punctate ; anterior margin behind head moderately excavate, membrane almost reaching apex of abdomen.

Long. 9 millim.

*Hab.* Malay Peninsula : Perak (*Doherty*).

Genus *PATRITIUS*, n. nom.

*Papirius*, Stål, Hem. Afr. ii. p. 122 (1865), nom. præocc.

*Patritius velutinus*.

*Ischnodemus velutinus*, Walk. Cat. Het. v. p. 128. n. 17 (1872).

Genus *ISCHNODEMUS*.*Ischnodemus australis*, sp. n.

Head, antennæ, pronotum, scutellum, abdomen above, and body beneath castaneous ; legs, rostrum, and sometimes basal margin of pronotum ochraceous ; corium pale luteous ; membrane greyish (sometimes smoky-brown) with the venation piceous ; lateral margins of the meso- and metasterna and the apex of the rostrum piceous.

Antennæ with the fourth joint longest, the second and third joints subequal in length ; pronotum with a central anterior sulcation, and a broad band of coarse punctures a little before base ; membrane about reaching base of penultimate abdominal segment ; anterior femora incrassated, with two or three small apical spines beneath.

*Var.* Antennæ (excluding basal joint) and pronotum (excluding base) piceous.

Long.  $6\frac{1}{2}$  to 8 millim.

*Hab.* North Australia : Port Darwin (*J. J. Walker*, Brit. Mus.).

*Ischnodemus noctulus*, sp. n.

Head, antennæ, pronotum, scutellum, membrane, and body beneath black ; legs piceous, apices of femora, the intermediate and posterior tibiæ (excluding bases), and the tarsi ochraceous ; corium piceous, its margins and an obscure spot at inner angle pale brownish grey ; membrane with a

waved fascia near base and a subapical spot brownish grey ; antennæ with the second joint a little longer than the third, fourth long and moderately clavate ; body finely and obscurely pilose above, much more distinctly so beneath.

Long.  $5\frac{1}{2}$  millim.

*Hab.* Ceylon (*G. Lewis*).

#### HEINSIUS, gen. nov.

Allied to *Ischnodemus* in general shape and structure, from which it differs principally by the antennæ, which in *Heinsius* are clavate, with the first, second, and third joints prominently hirsute, basal joint shortest and thickest, second joint about equal in length to fourth and slightly longer than third, fourth joint cylindrical and non-hirsute ; femora incrassated, anterior femora armed beneath with about two very fine and subobsolete spines.

#### *Heinsius explicatus*, sp. n.

Brownish ochraceous ; posterior area of the pronotum, clavus, and corium pale ochraceous ; membrane greyish with the veins fuscous ; a dark spot at the apical angles of corium ; body beneath greyishly pilose, lateral margins of the abdomen greyish.

Head and pronotum somewhat coarsely punctate, the corium more sparsely punctate.

Long. 4 to 5 millim.

*Hab.* N.W. Australia : Troughton and Baudin Islands (*J. J. Walker*, Brit. Mus.).

#### GEOCORINÆ.

#### Genus GEOCORIS.

#### *Geocoris tricolor*.

*Cimex tricolor*, Fabr. Ent. Syst. Suppl. p. 536. 176-7 (1798).

*Geocoris tricolor*, Stål, Hem. Fabr. i. p. 76 (1868).

*Ophthalmicus cinerascens*, Walk. Cat. Het. v. p. 138 (1872).

*Geocoris marginicollis*, Dohrn, Stett. ent. Zeit. xxi. p. 405 (1860).

#### *Geocoris æthiops*, sp. n.

*Ophthalmicus ruficeps*, Dall. nec Germ. List Hem. ii. p. 584. 5 (1852).

Pronotum and scutellum bluish black ; head, lateral and basal margins of pronotum (the last sometimes obsolete, except at centre), and extreme apex of scutellum ochraceous ; corium and membrane obscure whitish, corium with a large, apical, piceous patch ; sternum black, abdomen beneath

dark castaneous; head beneath, coxæ, legs, rostrum, and lateral margins of sternum and abdomen ochraceous; antennæ piceous, the first and fourth joints, and apices of second and third joints, stramineous.

Head impunctate; pronotum, excluding margins, coarsely punctate; scutellum, clavus, and sternum coarsely punctate; antennæ with the fourth joint slightly longer than the second.

Long. 4 millim.

*Hab.* West Africa: Sierra Leone (Brit. Mus.); Calabar (*Rutherford*, Coll. Dist.).

Differing from *G. ruficeps*, Germ., by the pale posterior and not anterior margin of pronotum, different colour of the corium, &c.

*Geocoris convivus*, sp. n.

Head and pronotum black; anterior margin and apex of head, antennæ, and head beneath (excluding basal spot behind eyes) pale ochraceous; sternum black; posterior lateral angles of prosternum, posterior and lateral margins of meso- and metasterna, coxæ, and legs pale ochraceous; scutellum black, with a transverse arcuated fascia near base centrally continued to apex pale ochraceous; corium pale ochraceous, clavus and an irregular spot on posterior margin piceous; membrane pale hyaline; abdomen beneath castaneous, its lateral margins ochraceous, its base and apex piceous.

Head finely wrinkled and punctate, the ochraceous margin and apex impunctate; pronotum coarsely punctate, its posterior margin impunctate; scutellum coarsely punctate, its central ochraceous fascia impunctate; clavus coarsely punctate near apex; antennæ with the second joint much longer than third, fourth mutilated.

Long. 4 millim.

*Hab.* Australia: Queensland, Peak Downs.

*Geocoris elongatus*, sp. n.

Piceous; anterior margin and apex of head, antennæ, inner and posterior margins of eyes, lateral margins of pronotum, a central fascia to scutellum (not reaching base and widened and arcuated anteriorly), connexivum, coxæ, legs, and lateral margins of sternum ochraceous; corium and membrane obscure whitish, the clavus and a large patch at inner angle of corium piceous; apical joint of antennæ black, its base ochraceous; abdomen beneath pale castaneous, its lateral margins ochraceous.

Head, excluding anterior margin, punctate and finely wrinkled; pronotum coarsely punctate, with one or two punctures on its lateral margins; scutellum (excluding central fascia) coarsely punctate; clavus coarsely punctate near apex; antennæ with the second joint longest, third a little shorter than fourth.

Long. 5 millim.

*Hab.* Australia: Queensland, Gayndah.

Allied to *G. provisus*, Bergr., which I have received from Sidney, but differing by its more elongate form, different colour of antennæ, abdomen beneath, &c.

*Geocoris vestitus*, sp. n.

Head black, lateral margins and apex broadly ochraceous; pronotum piceous, very coarsely punctate, a central spot on anterior and posterior margins, and the lateral margins widening posteriorly, luteous; scutellum black, coarsely punctate, its lateral angles narrowly luteous; corium and membrane very pale luteous, the first with its disk infuscated and sparingly punctate, its lateral margins impunctate, clavus longitudinally punctate; sternum piceous, very coarsely and somewhat greyishly punctate; abdomen castaneous, with its disk piceous; coxal spots greyish; antennæ, rostrum, legs, lateral margins of sternum, and anterior margin of prosternum ochraceous.

Long.  $2\frac{1}{2}$  millim.

*Hab.* Christmas Island (*C. W. Andrews*, Brit. Mus.).

Allied to the Neotropical species *G. thoracicus*, Fieb.

Genus *GERMALUS*.

*Germalus pallidus*, sp. n.

Pale ochraceous; apices of the eyes dark brown; head with two very small discal brown spots, the ocelli red; pronotum coarsely brownly punctate, except at central basal margin, and four transversely elongate spots situate a little before anterior margin, four longitudinal lines of dark punctures—two central and one on each lateral area; scutellum coarsely brownly punctate, with a  $\Upsilon$  levigate fascia; clavus sometimes shaded with piceous; membrane pellucid; connexivum with small piceous spots at apices of incisures.

Antennæ with the apical joint slightly incrassate and somewhat roseate in hue, second joint longest; eyes moderately stylate, their apices slightly in advance of the lateral margins of the pronotum; pronotum somewhat quadrangular, the anterior angles moderately oblique, lateral margins



slightly sinuate; corium somewhat thickly punctate, its margins levigate; abdomen above obscure whitish, the disk sometimes shaded with piceous and with a transverse levigate spot at the bases of the fourth and fifth abdominal segments.

Long.  $4\frac{1}{2}$  millim.

*Hab.* N.W. Australia, Baudin Island (*J. I. Walker*, Brit. Mus.).

The markings and punctuation of the pronotum will be alone sufficient to separate this species from the description of the only other described Australian species, *G. victoriae*, Bergr.

#### COLOBATHRISTINÆ.

##### Genus MALCUS.

##### *Malcus scutellata*, sp. n.

Ochraceous, coarsely brownly punctate, the corium paler and almost impunctate on basal disk and lateral margin; scutellum brownish, with a prominent, pale, ochraceous, levigate spot near each basal angle; membrane greyish, clouded with fuscous, and with the veins fuscous; legs and antennæ very pale ochraceous, the last with the basal joint castaneous and the apical joint fuscous.

Long. 3 millim.

*Hab.* Ceylon (*G. Lewis*).

A species to be differentiated from *M. flavidipes*, Stål, by the prominent ochraceous angular spots to the scutellum; the pronotum is also more tumid posteriorly.

#### HETEROGASTRINÆ.

##### Genus HYGINUS.

##### *Hyginus signifer*.

*Heterogaster signifer*, Walk. Cat. Het. v. p. 74. n. 12 (1872).

##### *Hyginus divisus*.

*Rhyparochromus divisus*, Walk. Cat. Het. v. p. 105. n. 174 (1872).

Both the above species are very closely allied. They seem to appertain to Stål's genus by the long and slender antennæ, and the convexly sinuate base of the pronotum, characters which separate *Hyginus* from *Heterogaster*.

##### Genus nov.?

*Heterogaster cymoides*, Walk. Cat. Het. v. p. 74. n. 13 (1872).

This species cannot be included in the genus *Heterogaster*,

but the condition of Walker's unique type is not sufficiently good for exact generic localization.

*DINOMACHUS*, gen. nov.

Allied to the Palæarctic genus *Heterogaster*\*, from which it differs by having the central lobe longer than, and projecting beyond, the lateral lobes; the head and body are also more elongate.

*Dinomachus Marshalli*, sp. n.

Ochraceous, thickly punctured with piceous; eyes black; corium with a spot near anterior third of lateral margin, another near apex of claval margin, and the apical third black, the last with two median spots and the apex ochraceous; membrane brownish ochraceous; connexivum ochraceous, spotted with black; body beneath piceous, greyishly pilose; coxæ, legs, disk of abdomen, and marginal spots ochraceous; femora punctured with brown on their basal areas and biannulated with the same colour near their apices, tibiæ with three brown annulations.

Pronotum with a somewhat obscure central transverse impression, and a central raised longitudinal line which extends through the apical area of the scutellum, but is obsolete on its basal area; apex of scutellum pale levigate; second joint of antennæ considerably longer than the first, remainder mutilated.

Long. 10 millim.

*Hab.* Mashonaland; Salisbury (*G. A. K. Marshall*).

*PACHYGRONTHINÆ*.

*Pachygrontha Walkeri*, sp. n.

Dark ochraceous, shaded with castaneous; antennæ, a central levigate line to pronotum (not reaching base), a central levigate line to scutellum, and a levigate spot near each lateral angle, lateral margins of corium, lateral margins of abdomen beneath, bases of femora, the tibiæ and tarsi pale ochraceous; apices of first joint of antennæ broadly, of second joint narrowly, a broad annulation before apex of third, posterior angles of pronotum, posterior margin (sometimes broken up in spots) of corium, apical joints of tarsi, and membrane (excluding base) piceous.

Antennæ with the apex of the basal joint prominently

\* I do not include the species described by Carpenter as *H. australis* from Murray Island.

clavate, distinctly longer than second joint, third a little shorter than second; body above coarsely punctate; posterior femora incrassated and spinous along nearly the whole of inner margin; pronotum laterally moderately sinuate, with a distinct transverse impression on disk.

Long. 7-8 millim.

*Hab.* North Australia, Port Darwin (*J. J. Walker*, Brit. Mus.).

*Pachygrontha Lewisi*, sp. n.

Ochraceous; body above, sternum, and legs coarsely punctate; pronotum with a central pale levigate fascia, bordered on each side with piceous, a spot of the same colour in each anterior lateral area, and one at each posterior angle; scutellum with the base black and a central, basal, lunate, levigate, pale fascia, continued in a straight line to apex, which is similarly levigate; inner claval margin and apex of clavus piceous; corium with the punctures arranged in longitudinal series, its apex and a somewhat large spot at inner angle piceous; membrane with two converging piceous fasciæ from base to apex; abdomen pale, impunctate; a lateral fascia on each side from head to apex of abdomen, a narrow central macular fascia to abdomen, and margins of the anal appendage black.

Antennæ with the second and third joints subequal in length, the first longest, fourth shortest. Eyes projecting a little beyond anterior margin of pronotum.

Long. 8 millim.

*Hab.* Ceylon (*G. Lewis*).

MAGNINUS, gen. nov.

Head longer than broad, immersed to eyes, central lobe produced in front of the lateral lobes, lateral lobes slightly angulated at their apices, broadened posteriorly from above the insertion of the antennæ, where they are very distinctly angulated; antennæ robust, first joint longest and stoutest, second joint the most slender, much shorter than first, a little longer than third, which is clavate towards its apex, fourth joint shortest, thickened, its apex attenuated; pronotum trapeziform; scutellum about as long as broad, both pronotum and scutellum traversed by a longitudinal median levigate line; corium extending to about two thirds the length of the abdomen, its apical margin nearly straight; membrane almost reaching the apex of the abdomen; connexivum exposed; anterior femora strongly incrassated and prominently spined beneath; anterior tibiæ curved at base;

rostrum reaching the anterior coxæ, first and second joints almost subequal in length, second joint almost reaching the base of the head.

Allied to *Pachygrontha*, but differing by the shape of the head, the structure of the antennæ, &c.

*Magninus typicus*, sp. n.

Ochraceous, thickly and coarsely brownly punctate; eyes, anterior and posterior margins of pronotum, disk of corium, and the membrane blackish; a very distinct, central, pale ochraceous, levigate line traversing the pronotum and scutellum and very obsoletely indicated on the head; head beneath and sternum brownly punctate; abdomen ochraceous, two central black fasciæ on mesosternum and a sublateral black fascia on each side of the abdomen, the lateral margins of which have a few dark punctures and the basal disk castaneous; legs ochraceous, the anterior femora brownly punctate, the intermediate and posterior femora castaneous above; apex of rostrum black.

Long. 8 millim.

*Hab.* N. Australia: Albany (*J. J. Walker*, Brit. Mus.).

*OXYCARENINÆ.*

Genus *OXYCARENUS*.

*Oxycarenus lugubris*.

*Stenogaster*? *lugubris*, Motsch. Etud. viii. p. 108 (1859).

*Rhopalus*? *funeralis*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 97, pl. iv. fig. 7 (1891).

*Oxycarenus maculatus*.

*Oxycarenus maculatus*, Stål, Öfv. Vet.-Ak. Förh. 1854, p. 235.

*Anthocoris subcruciatu*s, Walk. Cat. Het. v. p. 151. n. 15 (1872).

*Oxycarenus proximus*.

*Anthocoris proximus*, Walk. Cat. Het. v. p. 152. n. 16 (1872).

*Oxycarenus pubescens*.

*Anthocoris pubescens*, Walk. Cat. Het. v. p. 152. n. 17 (1872).

*Oxycarenus arctatus*.

*Anthocoris arctatus*, Walk. Cat. Het. v. p. 153. n. 18 (1872).



*APHANINÆ.*

## Genus CLERADA.

*Clerada apicicornis*.

*Clerada apicicornis*, Sign. in Maillard, Notes sur l'île de la Réunion, Ins. p. 28, pl. xx. fig. 8.

*Gastrodes terminalis*, Walk. Cat. Het. v. p. 122. n. 3 (1872).

*Clerada noctua*, sp. n.

Head, pronotum, and scutellum piceous; eyes and posterior margin of pronotum brownish ochraceous; corium brownish ochraceous, clavus (excluding margins), an oblique discal streak, and a sublateral fascia connected with about the inner apical third piceous; membrane obscure greyish; body beneath piceous; legs brownish ochraceous; antennæ ochraceous, the basal joint, apex of second joint, the whole of third joint, and apex of fourth joint piceous.

Head very thickly punctate; pronotum coarsely punctate, but almost impunctate on posterior margin; scutellum coarsely punctate, somewhat transversely wrinkled beyond middle; corium punctate, the veins and lateral margins levigate.

Long. 9 millim.; exp. pronot. angl.  $2\frac{1}{2}$  millim.

*Hab.* North Borneo (*W. B. Pryer*).

## NAVARRUS, gen. nov.

Body ovate, depressed. Head porrect, about half as long as the pronotum, inserted to the posterior margin of the eyes; ocelli placed very near the eyes; rostrum about reaching the anterior coxæ; first joint of the antennæ stout, slightly passing the apex of the head; pronotum transverse, much as in *Clerada*, lateral margins sinuate, posterior margin nearly straight; scutellum subequilateral; corium with the lateral margins moderately rounded. Other characters generally as in *Panchæa*, Stål, from which *Navarrus* differs by the shorter head &c.

*Navarrus phæophilus*.

*Rhyparochromus phæophilus*, Walk. Cat. Het. v. p. 106. n. 177 (1872).

*Hab.* Celebes (Brit. Mus.).

Head, anterior lobe of pronotum, and scutellum piceous.

## Genus PACTYE.

*Pactye dissimilis*.

*Lygæus dissimilis*, Walk. Cat. Het. v. p. 61. n. 128 (1872).—Sarawak.

Genus *PAROMIUS*.*Paromius seychellesus*.

*Plociomerus seychellesus*, Walk. Cat. Het. v. p. 120 (1872).

*Pamera ejuncida*, Dist. Trans. Ent. Soc. 1883, p. 433, pl. xx. fig. 3.

*Paromius seychellesus*, Leth. & Sev. Cat. Gén. Hém. t. ii. p. 189 (1894).

This appears to be a very widely distributed species. Walker's typical specimens were received from the Seychelle Islands; my *P. ejuncida* was founded on Japanese examples, and I now possess specimens from Ceylon, Queensland, and Samoa. I have followed Lethierry and Severin in placing the species in the genus *Paromius*, Fieb., taking *P. gracilis*, Ramb., as the nearest allied species. The slender elongate form alone sufficiently separates *Paromius* from *Pamera*, and I am doubtful whether the first should not be considered as a section only of the last.

*Paromius Dohrni*.

*Lygæus (Plociomerus) Dohrni*, Guér. in Sagra, Hist. de Cuba, Ins. p. 400 (1857).

*Ptochiomerus Dohrni*, Uhler, Proc. Zool. Soc. 1893, p. 705.

*PRIMERUS*, gen. nov.

Head moderately long and slender, pointed in front, the central lobe produced before the lateral lobes; antennæ with the basal joint stout, reaching for about half its length from the apex of the head, second longest and slender, third slender, shorter than second, and very slightly clavate at apex, fourth slightly thickened, about as long or a little shorter than the third; rostrum about reaching the posterior coxæ, basal joint shorter than the head. Pronotum with a narrow collar, strongly constricted near middle, the anterior lobe moderately globose and a little shorter than the posterior lobe; posterior margin before scutellum concave, lateral angles distinctly spinous, the spines directed backwards. Other characters generally as in *Prosomaus*, Scott, from which it differs by the longer rostrum, the spinous lateral angles of the pronotum, and by having the intermediate and posterior femora more slender, not apically clavate, and both without spines.

*Primierus bispinus*.

*Plociomerus bispinus*, Motsch. Bull. Soc. Nat. Mosc. 1863, p. 81.

Brownish ochraceous; apex of rostrum, apical joint of antennæ and apex of third joint, extreme apices of the tibiæ

and apices of the tarsal joints piceous or black; femora strongly punctured with castaneous; head and anterior lobe of pronotum brownish, posterior lobe of pronotum paler, very coarsely punctate, the posterior lateral margins luteous; scutellum with some castaneous markings and with a central luteous fascia on apical half; clavus and posterior claval margin longitudinally punctate, posterior lateral area of corium paler, punctate and preceded by a small luteous lateral spot; membrane somewhat mottled with dark castaneous, a paler spot at apex and on each lateral margin. Pronotal lateral spines distinct and directed backwards.

Long. 7 millim.; exp. pronot. angl.  $1\frac{3}{4}$  millim.

*Hab.* Ceylon (*Lewis*).

*Primierus indicus*, sp. n.

Brownish ochraceous; antennæ, head, anterior lobe of pronotum, scutellum, legs, and abdomen beneath reddish ochraceous; apical joint of antennæ and the sternum piceous, lateral margins of meso- and metasterna, and the abdomen, ochraceous.

Allied to the preceding species, but differing by the scarcely punctate femora, different colour of the legs, &c.

Long. 6–7 millim.; exp. pronot. angl.  $1\frac{3}{4}$  millim.

*Hab.* Calcutta (Atkins. Coll., Brit. Mus.).

GENUS *BEDUNIA*.

*Bedunia notulata*, sp. n.

Head, pronotum, scutellum, body beneath, and anterior femora black; anterior collar to pronotum castaneous, posterior margin with two central, transverse, lineate, ochraceous spots; corium ochraceous, irregularly punctate, clavus and outer claval area pale castaneous; claval margins ochraceous; a broad transverse fascia at area of inner angles and the apical angles black; membrane mutilated; antennæ and anterior tibiæ and tarsi brownish ochraceous; a broad annulation to apical joint of antennæ, base of apical joint to anterior tarsus, rostrum, and intermediate legs ochraceous; apex of rostrum and apices of intermediate femora castaneous; posterior legs mutilated.

Anterior femora very strongly incrassated, with a double series of small irregular spines beneath; head strongly exerted, anteocular area to apex of central lobe and postocular area subequal.

Long.  $10\frac{1}{2}$  millim.

*Hab.* Island of Mysol (*Wallace*, Brit. Mus.).

*Bedunia segmentata*, sp. n.

: Head, pronotum, scutellum, and body beneath black; antennæ and anterior femora castaneous; apical joint of antennæ (excluding base and apex), rostrum, anterior femora and tarsi, intermediate and posterior legs, lateral angles of pronotum, and the corium ochraceous; clavus, two large discal spots, and apical angle to corium castaneous, and a few brown punctures to the basal, marginal, and apical areas; membrane fuliginous, with a large spot at apex and the veins creamy white; rostrum passing the posterior coxæ, its apex piceous.

Eyes a little less distant from base of head than from apex; second joint of antennæ longest, first and fourth joints nearly equal in length; posterior lobe of pronotum, scutellum, and clavus coarsely punctate.

Long. 11 millim.

*Hab.* Malay Peninsula: Perak (*Doherty*).

## Genus PAMERA.

*Pamera cincticornis*.

*Rhyparochromus cincticornis*, Walk. Cat. Het. v. p. 108. n. 181 (1872).

Closely allied to *P. pallicornis*, Dall., but larger, antennæ longer. An var.?

*Pamera pallicornis*.

*Rhyparochromus pallicornis*, Dall. List Hem. ii. p. 573 (1852).

*Rhyparochromus delineatus*, Walk. Cat. Het. v. p. 103. n. 169 (1872).

*Pamera cephalotes*.

*Rhyparochromus cephalotes*, Dall. List Hem. ii. p. 577 (1852); Walk. Cat. Het. v. p. 109 (1873).

*Rhyparochromus nigripes*, Dall. List Hem. ii. p. 578 (1852).

*Pamera Scotti*, n. nom.

*Diplonotus luridus*, Scott, Ann. & Mag. Nat. Hist. (4) xiv. p. 432 (1874), nom. præocc.

Lethierry and Severin (Cat. Gén. Hém. t. ii. p. 193) have placed this species as a synonym of *P. pallicornis*, Dall., with which it has scarcely anything in common. Scott's types are now in the British Museum and co-types of most of his Japan species in my own collection.

*Pamera nigrītula*.

*Rhyparochromus nigrītulus*, Walk. Cat. Het. v. p. 106. n. 176 (1872).



*Pamera nigriceps*.*Rhyparochromus nigriceps*, Dall. List Hem. ii. p. 577 (1852).Var. *Rhyparochromus inornatus*, Walk. Cat. Het. v. p. 112. n. 196 (1872).*Pamera ? stricta*.*Rhyparochromus strictus*, Walk. Cat. Het. v. p. 108. n. 182 (1872).

The unique typical specimen is in exceedingly bad condition, but appears to belong to the section *Gyndes* of the genus, and somewhat allied to *Eucosmetus albomarginatus*, Scott.

*Pamera vincta*.*Pamera vincta*, Say, Hem. New Harm. 1831; Compl. Writ. i. p. 333 (1859).*Rhyparochromus gutta*, Dall. List Hem. ii. p. 574 (1852).*Rhyparochromus parvulus*, Dall. tom. cit. p. 576. n. 45 (1852).*Lygæus (Plociomerus) Amyoti*, Guér. in Sagra, Hist. de Cuba, Ins. p. 400 (1857).*Rhyparochromus (Plociomerus) vinulus*, Stål, Freg. Eug. resa, Ins. Hem. p. 246. n. 66 (1859).*Ligyrocoris bipunctatus*, Kirby, Journ. Linn. Soc., Zool. xx. p. 547 (1894).

A very widely distributed species. I possess specimens from both Ceylon and India, and Mr. Andrews brought back specimens from Christmas Island.

*Pamera repressa*.*Rhyparochromus repressus*, Walk. Cat. Het. v. p. 104. n. 172 (1872).*Dieuches repressus*, Leth. & Sev. Cat. Gén. Hém. t. ii. p. 220 (1894).*Pamera pusilla*.*Rhyparochromus pusillus*, Dall. List Hem. ii. p. 577. n. 46 (1852).

The unique type is in poor condition and without locality.

*Pamera reducta*.*Plociomerus reductus*, Walk. Cat. Het. v. p. 120. n. 34 (1872).*Paromius? reductus*, Leth. & Sev. Cat. Gén. Hém. t. ii. p. 189 (1894).

Pronotum with the anterior lobe black, the posterior lobe castaneous in all the specimens described by Walker.

*Pamera sobrina*, sp. n.

Head pale piceous; pronotum, scutellum, and body beneath pale castaneous; corium, membrane, antennæ, rostrum, and legs ochraceous; apices of the second and third joints of the antennæ and apical half of the fourth joint infuscated.

Anterior lobe of the pronotum prominent, globose ; corium punctate, its lateral margins pale, impunctate.

Long.  $4\frac{1}{2}$ –5 millim.

*Hab.* Calcutta (Atkins. Coll., Brit. Mus.) ; Ceylon (*G. Lewis*).

*Pamera Andrewsii*, sp. n.

Head, anterior lobe of pronotum, and scutellum black ; posterior lobe of pronotum castaneous ; antennæ, a spot above and a smaller spot beneath the lateral angles and the anterior and posterior margins (narrowly) of the pronotum, and two small central spots to scutellum, ochraceous ; corium ochraceous, punctured with castaneous, the lateral margins levigate, with a spot before apex and the apical angle blackish ; membrane pale brownish, irrorated with ochraceous ; legs ochraceous, femora with broad castaneous sub-apical annulations ; antennæ ochraceous, basal and apical joints and the apices of second and third joints castaneous.

Long. 4– $4\frac{1}{2}$  millim.

*Hab.* Christmas Island (*C. W. Andrews*, Brit. Mus.).

A species having a considerable superficial resemblance to the Palæarctic *P. calcarata*, Puton, but much smaller. *P. Andrewsii* varies in the colour of the pronotum, being sometimes unicolorous—black or castaneous. It is allied to *P. nigriceps*, Dall.

*Pamera insignis*, sp. n.

Black ; posterior lateral margins of the pronotum and broad lateral margins to the corium pale luteous, the last slightly inwardly notched near centre ; antennæ ochraceous, basal joint, apices of second and third joints, and apical half of fourth joint fuscous or black ; legs black, the tibiæ and tarsi ochraceous, apices of the tibiæ fuscous.

Long. 5 millim.

*Hab.* Christmas Island (*C. W. Andrews*, Brit. Mus.).

*Pamera thoracica*, sp. n.

Head piceous, antennæ brownish ochraceous ; pronotum castaneous, anterior lobe with the anterior and lateral margins and a central longitudinal fascia, posterior lobe with the lateral angles and two central basal spots, ochraceous ; scutellum piceous ; corium ochraceous, apical angle and a small lateral spot beyond middle castaneous, the inner area more or less suffused with castaneous, enclosing an angulated greyish spot at inner angle ; membrane pale brownish, with

the veins greyish ; body beneath and legs dark castaneous, the tibiæ, tarsi, and apices of femora ochraceous.

Long. 5 millim.

*Hab.* Queensland : Peak Downs.

Belongs to the section of the genus including *P. nigriceps*, Dall., and *P. Andrewsii*, Dist.

*Pamera murrhea*, sp. n.

Head, anterior lobe of pronotum, and scutellum brownish ochraceous ; posterior lobe of pronotum and the corium of a greyish-porcelain appearance, sparingly brownly punctate ; anterior lobe of pronotum with two large subquadrate dark brown spots, posterior lobe with a central dark brown longitudinal fascia ; scutellum sparingly punctate, a spot at each basal angle and a central fascia dark brown ; corium with the apical angle dark fuscous ; membrane greyish, with pale brown suffusions, palest at base and apex ; head and sternum beneath pale brown, sternal, lateral, and segmental margins ochraceous ; abdomen ochraceous, with a broad pale brown lateral margin ; legs and antennæ ochraceous, the last with the apices of second and third joints and the whole of the fourth joint infuscated ; anterior femora incrassated, finely spinous beneath.

Long. 4 millim.

*Hab.* N.W. Australia : Roebuck Bay (*J. J. Walker*, Brit. Mus.).

A very distinct species by its beautiful markings and incrassated anterior femora.

Genus *EUCOSMETUS*

*Eucosmetus insignis*, sp. n.

Head, pronotum, scutellum, membrane, body beneath, and legs black ; corium pale reddish, with a very small sublateral spot near base, a median lateral spot, and the apical area very pale luteous, a black linear lateral spot between the pale median spot and apical area, and a subapical angulate spot black ; membrane with an apical, rounded, very pale luteous spot ; apex of anterior femora and the whole of the anterior tibiæ and tarsi, basal halves of the intermediate and posterior femora and the tarsi, and central base of head beneath ochraceous ; first joint of antennæ black, with its base luteous, remaining joints mutilated.

Head and posterior lobe of pronotum coarsely punctate ; clavus and claval margin lineately punctate ; anterior tibiæ curved, its apex moderately dilated and armed with two strong spines beneath.

Long.  $6\frac{1}{2}$  millim.

*Hab.* Assam : Margherita (Ind. Mus. and Coll. Dist.).

*Eucosmetus albomarginatus*.

*Gyndes albomarginatus*, Scott, Ann. & Mag. Nat. Hist. (4) vol. xiv. p. 437 (1874).

*Eucosmetus incisus*.

*Rhyparochromus incisus*, Walk. Cat. Het. v. p. 100. n. 158 (1872).

*Plociomerus incisus*, Kirby, Journ. Linn. Soc., Zool. vol. xxiv. p. 101 (1891).

## Genus DAERLAC.

*Daerlac affinis*, sp. n.

Black; basal half of corium, basal joint of antennæ, base of anterior femora, basal halves of intermediate and posterior femora, and extreme apices of all the femora ochraceous; the ochraceous half of corium is followed by a transverse black fascia, the apical angle and central lateral margin grey; a grey spot on connexivum near apical angle of corium; body beneath black, a single central grey lateral spot placed beneath the one on connexivum above.

Head and anterior lobe of pronotum thickly and finely punctate; posterior pronotal lobe, scutellum, and clavus much more coarsely punctate.

Long. 6 millim.

*Hab.* N.E. Tasmania: Launceston (*J. J. Walker*, Brit. Mus.).

Allied to *D. tricolor*, Sign., from which it differs by the different colour of the legs, the absence of the white fascia and lateral margins to the abdomen, &c.

## Genus CNEMODUS.

*Cnemodus mavortius*.

*Astemma mavortius*, Say, New Harm. Ind., Dec. 1831; Compl. Writ. i. p. 337 (1859).

*Thaumastopus? alacris*, Walk. Cat. Het. v. p. 147. n. 2 (1872).

## MIZALDUS, gen. nov.

Head triangular, long, immersed to about the eyes; ocelli situate close to eyes and well separated from base. Antennæ with the first joint moderately clavate and considerably passing the apex of head, second joint longest, fourth a little shorter than third and moderately thickened. Pronotum with the anterior margin narrower than the outer margins of eyes, its anterior angles a little prominent, a little more than half the width of base, the lateral margins very strongly sinuate; transversely constricted near centre, the anterior lobe moderately globose, the posterior lobe with its basal margin moderately concave before the scutellum; lateral

angles excavated. Scutellum moderately gibbous at basal area, its apex acute. Corium a little narrower than the abdomen, the margins of which are exposed and a little prominent, strongly sinuate near base and widened posteriorly. Rostrum with the basal joint a little shorter than the head.

Allied to the genus *Bathycles*, Dist.

*Mizaldus dimidiatus*.

*Rhyparochromus dimidiatus*, Walk. Cat. Het. v. p. 107. n. 179 (1872).

*Hab.* New Guinea.

*Mizaldus Lewisi*, sp. n.

Black; corium creamy white, with an apical angular black spot, membrane pale greyish hyaline; body beneath black; legs and antennæ ochraceous, femora and basal joint of antennæ pale castaneous, apical joint of antennæ fuscous. Head, pronotum, and scutellum coarsely punctate; clavus and lateral area of corium more sparingly punctate.

Long. 4 millim.

*Hab.* Ceylon (*G. Lewis*).

APPOLONIUS, gen. nov.

Head (including outer margins of eyes) a little broader than anterior margin of pronotum; eyes prominent, globose; ocelli situate very near eyes; antennæ with the third and fourth joints prominently clavate, second, third, and fourth joints subequal in length, first a little shorter. Pronotum strongly and transversely constricted, the anterior lobe a little longer than the posterior lobe, but narrower and globose; posterior lobe with its lateral margins oblique; scutellum with the basal area moderately tumescent; anterior femora moderately incrassated.

This genus is allied to *Neocattarus*, Dist., and can at once be recognized by the peculiar antennæ and the position of the ocelli. Its type is the species described by Walker as *Ophthalmicus cincticornis*, of which the unique type is a carded specimen, thus rendering the generic diagnosis of a limited character.

*Appolonius cincticornis*.

*Ophthalmicus cincticornis*, Walk. Cat. Het. v. p. 138. n. 32 (1872).

Head and anterior lobe of pronotum black; the posterior lobe dark castaneous, with its anterior lateral margin luteous; antennæ with the first and second joints luteous, with their bases and apex of the second joint pale castaneous, third and fourth joints castaneous, apex of fourth joint much paler;



scutellum piceous; corium pale luteous, with the apex and a broken central transverse fascia castaneous; membrane pale cretaceous, with the veins brownish; legs ochraceous, tibiæ luteous.

Long.  $2\frac{3}{4}$  millim.

*Hab.* Ceylon (*Thwaites*, Brit. Mus.).

*RHODIGINUS*, gen. nov.

Head triangular, rather narrowed in front; eyes large, prominent, somewhat exserted, their posterior margins almost touching the anterior margin of the pronotum; antennæ moderately robust, first and fourth joints thickest, third joint minute; pronotum strongly sinuated laterally, transversely impressed about centre, the lateral angles obtusely rounded, posterior margin slightly concave, anterior margin nearly straight; scutellum moderately gibbous at base, with a central carinate line on apical half; corium short and narrow, barely occupying two-thirds the length of the abdomen; membrane very large, extending broadly from the apex of the clavus to the apex of the abdomen; rostrum reaching the intermediate coxæ; anterior femora unarmed and only moderately incrassated.

I place this genus provisionally near *Appolonius*.

*Rhodiginus dispar*.

*Ophthalmicus dispar*, Walk. Cat. Het. v. p. 139. n. 33 (1872).

*Hab.* Ceylon (Brit. Mus.).

Genus *RHYPAROCHROMUS*.

*Rhyparochromus convelatus*, sp. n.

Head, antennæ, pronotum, scutellum, rostrum, body beneath, and legs piceous; lateral margins of pronotum, coxæ, posterior margin of metasternum, extreme bases of tibiæ, and the tarsi ochraceous; corium ochraceous with lineate brown punctures, apical half piceous, containing a transverse greyish-white fascia; membrane piceous, its apical half irrorated with pale brownish. Antennæ moderately robust, second, third, and fourth joints almost subequal in length; pronotum with a distinct transverse impression, anterior lobe moderately convex, posterior lobe somewhat thickly punctate; scutellum long, finely punctate, with a central carinate line, obsolete on basal half; lateral margins of head and pronotum distinctly longly pilose.

Long. 8 millim.

*Hab.* Bombay (Coll. Dist.).

Allied to *R. semilucens*, Walk., from which it can be at once separated, apart from structural details, by the different colour of the body beneath.

## FÆLICIANUS, gen. nov.

Head pointed in front, about as long as the anterior lobe of the pronotum; eyes almost touching the anterior margin of the pronotum, ocelli much nearer to eyes than to each other; antennæ with the first joint considerably passing the apex of the head, fourth joint much shorter than the second, a little shorter than the third, slightly longer than the first; pronotum narrowed towards apex, deeply impressed across its centre, its lateral margins moderately sinuate at the incision and then rounded and moderately narrowed to apex, the anterior lobe moderately globose; scutellum somewhat tumid, flattened and hollowed near base; rostrum almost reaching the intermediate coxæ, basal joint slightly shorter than the head; anterior femora strongly incrassated, spined beneath, one spine very prominent; anterior tibiæ slightly curved.

Allied to *Rhyparochromus*, from which the relative lengths of the antennal joints will alone sufficiently distinguish it; the pronotum is also less gibbous and the anterior and posterior lobes about subequal in length.

*Fælicianus luteicornis*.

*Rhyparochromus luteicornis*, Walk. Cat. Het. v. p. 107. n. 178 (1872).

*Hab.* Celebes (Brit. Mus.).

[To be continued.]

LX.—*List of the Fishes of the Characinid Genus Alestes, Müll. & Trosch., with a Key to their Identification* \*.  
By G. A. BOULENGER, F.R.S.

I. Sq. 36-50  $\frac{6\frac{1}{2}-9\frac{1}{2}}{3\frac{1}{2}}$ .

A. Dorsal originating above ventrals; gill-rakers 17-20 on lower part of anterior arch.

A. 21-22; Sq. 40-43  $\frac{6\frac{1}{2}-7\frac{1}{2}}{3\frac{1}{2}}$  ..... 1. *A. macrophthalmus*, Gthr.

A. 18-19; Sq. 39-41  $\frac{6\frac{1}{2}}{2\frac{1}{2}}$  ..... 2. *A. Liebrechtsii*, Blgr.

B. Dorsal behind vertical of ventrals.

1. Sq. 45-50  $\frac{8\frac{1}{2}-9\frac{1}{2}}{3\frac{1}{2}}$ .

A. 25-30; gill-rakers 30-35 on lower part of anterior arch; dorsal equidistant from vertical of last ray of ventral

\* The numbers in the anal fin (A.) include the two rudimentary anterior rays, and the last ray, cleft to the base, is reckoned as one; the transverse series of scales is counted from the mid-dorsal to the mid-ventral line. The dorsal rays are constantly 10 or 11.

- and first of anal or a little nearer the latter . . . . . 3. *A. baremose*, Joannis.
- A. 20-25; gill-rakers 20-25 on lower part of anterior arch; dorsal originating just behind vertical of last ray of ventral . . . . . 4. *A. dentex*, L.
2. Sq. 36  $\frac{6\frac{1}{2}}{3\frac{1}{2}}$ ; A. 24. . . . . 5. *A. Stuhlmanni*, Pfeff.
- II. Sq. 22-32  $\frac{4\frac{1}{2}-5\frac{1}{2}}{2\frac{1}{2}-3\frac{1}{2}}$ .
- A. Dorsal originating above ventrals.
1. A. 15-17; gill-rakers 16-18 on lower part of anterior arch.
- Sq. 27-31  $\frac{5\frac{1}{2}}{3\frac{1}{2}}$  . . . . . 6. *A. nurse*, Rüpp.
- Sq. 24-26  $\frac{4\frac{1}{2}}{3\frac{1}{2}}$  . . . . . 7. *A. imberi*, Ptrs.
2. A. 18-19.
- Sq. 30-32  $\frac{5\frac{1}{2}}{3\frac{1}{2}}$ ; depth of body 4 times in total length; gill-rakers 18-20 on lower part of the anterior arch . . . 8. *A. lateralis*, Blgr.
- Sq. 29-30  $\frac{5\frac{1}{2}}{3\frac{1}{2}}$ ; depth of body  $2\frac{2}{3}$  to 3 times in total length; gill-rakers 15-18 . . 9. *A. senegalensis*, Sldr.
- Sq. 27-29  $\frac{4\frac{1}{2}}{3\frac{1}{2}}$ ; depth of body 3 to  $3\frac{1}{2}$  times in total length; gill-rakers 18 . . . 10. *A. Lemairii*, Blgr.
3. A. 21-24; Sq. 24-28  $\frac{5\frac{1}{2}}{3\frac{1}{2}}$ ; gill-rakers 13-14 on lower part of anterior arch. . . . . 11. *A. longipinnis*, Gthr.
- B. Dorsal originating above or a little behind vertical of last ray of ventrals; a little nearer caudal fin than end of snout.
1. A. 19-22; Sq. 23-27.
- Sq. 25-27  $\frac{5\frac{1}{2}}{3\frac{1}{2}}$ ; eye as long as postorbital part of head; gill-rakers 15 on lower part of anterior arch . . . . . 12. *A. Chaperi*, Sauv.
- Sq. 25-26  $\frac{5\frac{1}{2}}{3\frac{1}{2}}$ ; eye shorter than postorbital part of head; gill-rakers 18-20. 13. *A. affinis*, Gthr.
- Sq. 23  $\frac{4\frac{1}{2}}{3\frac{1}{2}}$ ; eye shorter than postorbital part of head; gill-rakers 25 . . . . 14. *A. tæniurus*, Gthr.
2. A. 15-18.
- A. 17-18; Sq. 23-26  $\frac{4\frac{1}{2}}{3\frac{1}{2}}$ ; gill-rakers 17-18 on lower part of anterior arch . . 15. *A. Fuchsii*, Blgr.
- A. 15-17; Sq. 27-29  $\frac{4\frac{1}{2}}{3\frac{1}{2}}$ ; gill-rakers 22-26. 16. *A. bimaculatus*, Blgr.
- A. 15-16; Sq. 23-24  $\frac{4\frac{1}{2}}{3\frac{1}{2}}$ ; gill-rakers 16-17. 17. *A. Kingsleyæ*, Gthr.
- C. Dorsal far behind vertical of ventrals, originating much nearer caudal fin than end of snout.
- A. 15-17; Sq. 22-24  $\frac{4\frac{1}{2}}{2\frac{1}{2}}$  . . . . . 18. *A. macrolepidotus*, C. & V.
- A. 13-14; Sq. 24-27  $\frac{4\frac{1}{2}}{2\frac{1}{2}}$  . . . . . 19. *A. grandisquamis*, Blgr.

1. *Alestes macrophthalmus*.

Günth. Ann. & Mag. N. H. (3) xx. 1867, p. 113; Bouleng. Poiss. Congo, p. 151 (1901).

Gaboon, Ogowé, Congo, L. Tanganyika, L. Mweru.

2. *A. Liebrechtsii*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 29, pl. xv. (1898), and *l. c.* p. 152. Congo.

3. *A. baremose*.

*Salmo niloticus* (non Hasselq.), Linn. S. N. i. p. 514 (1766).

*Cyprinus dentex* (non Hasselq.), Linn. *t. c.* p. 531.

*Myletes baremose*, Joannis, Mag. Zool. 1835, pl. vi.

*Myletes Hasselquistii* (non Cuv.), Guér. Icon. R. An., Poiss. pl. lvi. fig. 1 (1844).

*Alestes Kotschyi*, Heckel, in Russegger, Reise, ii. pt. 3, p. 308, pl. xxi. fig. 3 (1849); Günth. Cat. Fish. v. p. 313 (1864); Steind. Sitzb. Ak. Wien, lxi. i. 1870, p. 543; Vincig. Ann. Mus. Genova, (2) xix. 1898, p. 257.

*Alestes Wytsi*, Steind. *l. c.* p. 542, pl. ii. fig. 1.

Nile, L. Rudolf, Senegal, Gambia, Niger.

4. *A. dentex*.

*Salmo dentex*, Linn. in Hasselq. Iter, p. 395 (1757).

*Characinus niloticus*, Geoffr. Descr. Egypte, Poiss. p. 50, pl. iv. fig. 2 (1809).

*Myletes Hasselquistii*, Cuv. Mém. Mus. iv. 1818, p. 449, pl. xxi. fig. 2.

*Alestes dentex*, Müll. & Trosch. Hor. Ichth. i. p. 13, pl. ii. fig. 6 (1845); Heckel, in Russegger, Reise, ii. pt. 3, p. 307, pl. xxi. fig. 2 (1849); Günth. Cat. Fish. v. p. 312 (1864).

*Alestes Hasselquistii*, Cuv. & Val. Hist. Poiss. xxii. p. 180 (1849).

*Alestes sethente*, Cuv. & Val. *t. c.* p. 190; Günth. *t. c.* p. 313; Steind. Sitzb. Ak. Wien, lxi. i. 1870, p. 541.

Nile, Senegal, Gambia, Niger.

5. *A. Stuhlmanni*.

Pfeffer, Thierw. O.-Afr., Fische, p. 44 (1896).

Kingani R., German East Africa.

6. *A. nurse*.

*Myletes nurse*, Rüppell, Fortsetz. Beschr. Fische Nils, p. 12, pl. ii. fig. 3 (1832).

*Myletes guile*, Joannis, Rev. et Mag. Zool. 1835, Poiss. pl. ix.

*Alestes nurse*, Müll. & Trosch. Hor. Ichth. i. p. 13 (1845); Cuv. & Val. Hist. Poiss. xxii. p. 188 (1849); Steind. Sitzb. Ak. Wien, lxi. i. 1870, p. 544.

*Chalceus guile*, Cuv. & Val. *t. c.* p. 255.

*Brachyalestes nurse*, Günth. Cat. Fish. v. p. 314 (1864).

*Brachyalestes Rüppellii*, Günth. *t. c.* p. 315; Pfeffer, Thierw. O.-Afr., Fische, p. 43 (1896).

*Alestes leuciscus*, Günth. Ann. & Mag. N. H. (3) xx. 1867, p. 114.

*Alestes Rüppellii*, Günth. in Petherick, Trav. C. Afr. ii. p. 343 (1869); Vincig. Ann. Mus. Genova, (2) xix. 1898, p. 257.

Nile, L. Victoria, L. Rudolf, Senegal, Gambia, Niger.

7. *A. imberi*.

Peters, Mon. Berl. Ac. 1852, p. 276, and Reise Mossamb. iv. p. 66, pl. xii. fig. 3 (1868).

*Brachyalestes imberi*, Günth. Cat. Fish. v. p. 316 (1864); Pfeffer, Thierw. O.-Afr., Fische, p. 43, fig. (1896).

Zambesi, L. Nyasa, German East Africa.

8. *A. lateralis*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 130, pl. xlviii. fig. 2 (1900), and Poiss. Congo, p. 153 (1901).

L. Dilolo, C. Africa.

9. *A. senegalensis*.

Steind. Sitzb. Ak. Wien, lxi. i. 1870, p. 545, pl. ii. fig. 2.

Senegal.

10. *A. Lemairii*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 84, pl. xxxvi. fig. 2 (1899), and Poiss. Congo, p. 154 (1901).

L. Mweru, C. Africa.

11. *A. longipinnis*.

*Brachyalestes longipinnis*, Günth. Cat. Fish. v. p. 315 (1864).

*Alestes longipinnis*, Steind. Notes Leyd. Mus. xvi. 1894, p. 64; Bouleng. Poiss. Congo, p. 150 (1901).

Sierra Leone to Congo.

12. *A. Chaperi*.

Sauvage, Bull. Soc. Zool. France, 1882, p. 320, pl. v. fig. 3.

Gold Coast.

13. *A. affinis*.

Günth. Proc. Zool. Soc. 1894, p. 90; Vincig. Ann. Mus. Genova, (2) xvii. 1896-1897, pp. 28 & 355.

East Africa.

14. *A. taeniurus*.

Günth. Ann. & Mag. N. H. (3) xx. 1867, p. 113; Bouleng. Poiss. Congo, p. 156 (1901).

Gaboon, Congo.

15. *A. Fuchsii*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 83, pl. xxxvi. fig. 1 (1899), and l. c. p. 155.

Congo.

16. *A. bimaculatus*.

Bouleng. ll. cc. p. 85, pl. xxxvi. fig. 3, and p. 157.

Congo.



17. *A. Kingsleyæ*.

Günth. Ann. & Mag. N. H. (6) xvii. 1896, p. 279, pl. xv. fig. B.  
Ogowé.

18. *A. macrolepidotus*.

*Brycinus macrolepidotus*, Cuv. & Val. Hist. Poiss. xx. p. 157,  
pl. cccccxxxix. (1849).  
*Alestes macrolepidotus*, Bilharz, Sitzb. Ak. Wien, ix. 1852, p. 469,  
pl. xxxvii.; Kner, Denkschr. Ak. Wien, xviii. 1860, p. 19; Günth.  
Cat. Fish. v. p. 313 (1864); Steind. Sitzb. Ak. Wien, lxi. i. 1870,  
p. 540, pl. i., and Notes Leyd. Mus. xvi. 1894, p. 63; Bouleng. Poiss.  
Congo, p. 158 (1901).

Nile, West Africa from Senegal to Ogowé, L. Tanganyika.

19. *A. grandisquamis*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 85, pl. xxxv. fig. 3 (1899), and  
l. c. p. 159.  
Congo.

## BIBLIOGRAPHICAL NOTICE.

*Biologia Centrali-Americana.*

*Land and Freshwater Mollusca.* By Prof. EDUARD VON MARTENS.

THIS work, commenced so long ago as 1890, has at length been completed. It consists of 706 pages of text and 44 plates, 28 being coloured and 16 uncoloured. The introductory portion, pp. i-xxviii, gives some account of the different collectors and travellers who have obtained specimens in the various countries under consideration. It includes also some interesting notes on the geographical distribution of the genera of Mollusca found in those regions and observations on the intermingling of North- and South-American forms within their limits. The main portion of the work consists of lists of the known forms of the various genera treated of, full synonymy and references, with descriptions of many new forms and varieties.

A distinct feature of this work consists of comparative tables of species, at the commencement of each genus, giving a summary of their conchological differences, these tables being employed instead of a separate diagnostical description of each form. They will doubtless prove of great assistance to the student in naming his collection, the differentiating features of all the various forms being seen at a glance.

Great care and labour have evidently been expended in the production of this volume, which necessarily for many years will be the standard work of reference on the subject treated of. The author is to be congratulated on the completion of this the latest of his many valuable contributions to conchological science; and the

best thanks of the scientific world are due to Messrs. F. D. Godman and the late O. Salvin, the able editors of this work, through whose enterprise alone the publication of such a series of monographs has been possible.

In conclusion, it is a great satisfaction to record the donation to the National Collection of the specimens of land and freshwater shells (between four and five thousand specimens) which form the basis of the work before us. This is only one of the many generous gifts to the Museum for which both the scientific world and the public at large are indebted to Mr. Godman. E. A. SMITH.

## MISCELLANEOUS.

*Dates of Publication of the Zoological and Botanical portions of some French Voyages.*—Part II. Ferret and Galinier's '*Voyage en Abyssinie*'; Lefebvre's '*Voyage en Abyssinie*'; '*Exploration scientifique de l'Algérie*'; Castelnau's '*Amérique du Sud*'; Dumont d'Urville's '*Voyage de l'Astrolabe*'; Laplace's '*Voyage sur la Favorite*'; Jacquemont's '*Voyage dans l'Inde*'; Tréhouart's '*Commission scientifique d'Islande*'; Cailliaud, '*Voyage à Méroé*'; '*Expédition scientifique de Morée*'; Fabvre, '*Commission scientifique du Nord*'; Du Petit-Thouars, '*Voyage de la Vénus*'; and on the Dates of the '*Faune Française*.' By C. DAVIES SHERBORN, F.Z.S., and B. B. WOODWARD, F.L.S. &c.

[Concluded from p. 336.]

Commission scientifique du Nord. Voyages . . . en Scandinavie, en Laponie, au Spitzberg et aux Férœ, pendant . . . 1838-40, sur . . . la Recherche, commandée par M. FABVRE . . .'

BOTANIQUE. = Several papers in vol. ii., of which "Voy. bot . . . côtes . . . de Drontheim au Cap Nord. Par Martins" seems to have appeared in Sept. 1846 (Wieg. Archiv, 1847, ii. 416).

GÉOLOGIE, by E. Robert. Mainly glaciation, but part 2 contains some ethnographical papers; a "Liste des Fossiles du gravier coquillier de la Norvège," par Keilhau; and "Fossiles du Spitzberg" [two papers], par de Koninek. Part 1 (pp. 1-210) of this section was notified 1 June, 1844 (Bibl. Franç.), and part 2 (pp. 211-308) in 1855 (Bull. Soc. géol. France, [2] xii. 1855, p. 285).

GÉOLOGIE, by J. Durocher. Pt. 1 (pp. 1-216), C. Rendus, 23 Jan. 1843, p. 213. Pt. 2 (pp. 217-482), 1855, Bull. Soc. géol. France, [2] xiii. 1856, p. 305.

GÉOGRAPHIE PHYSIQUE. By Ch. Martins et alii.

Tom. I. Pt. 1, pp. 1-236. C. Rendus, Jan. 1844, p. 164.

2, 236-474. " Mar. 1846, p. 440.

Tom. II. Pt. 1, pp. 1-278. " July 1846, p. 111.

1st paper appeared Mém. Cour. Belge, xv. (1841).

2nd " " Bibl. Univ. lviii. (1845).

3rd " " in 1846 (Wieg. Arch. 1847, ii. 416) as a separate, being issued probably in advance.

Tom. II. Pt. 2.

4th paper appeared *Ann. Chem.* xxiv. (1848), xxv. (1849). Also issued separately in 1848.

5th (pars) „ *Ann. Sci. Nat. (Bot.)* xi. (1849).

A separate copy of the last paper in this part was laid before the Academy in Jan. 1850 (*C. R.* tom. xxx. p. 55). It may, we think, be fairly inferred that the completed part appeared soon after, and we take 1850 for the date of this part.

ZOOLOGIE. [Consisting of plates of Fishes, Birds, Crustacea, Annelids, Medusæ, and Protozoa, all without text. Some of the Fishes and Crustacea were described by H. Krøyer in his *Nat. Tijdschrift*, [2] vols. i. & ii. (1844-49).]

The first livraison of the whole work was issued in 1842 (*Bull. Soc. géogr. Franç.* [2] xviii. p. 446). J. [L. M.] Vahl, whose name appears on the titlepage of the “*Géogr. phys.*,” did not contribute to the literature of this Voyage, but did to the ‘*Voyage en Islande*,’ which was going through the press at the same time.

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‘*Voyage autour du Monde sur . . . la Vénus, pendant . . . 1836-39 . . .* Par A. DU PETIT-THOUARS, &c.’

ZOOLOGIE. Pp. 355.

Mammifères. By Isidore Geoffroy Saint-Hilaire (and J. Pucheran). 1852. *C. Rendus*, Feb. 1852, p. 258.

Oiseaux. By Prévost and Des Murs. 1849. *Wieg. Arch.* 1850, p. 46.

Reptiles. By Duméril. No text up to 1847. *Wieg. Arch.* 1848, p. 196.

Ichthyologie. By Valenciennes. No text up to 1847. *Wieg. Arch.* 1848, p. 203.

“Mollusca.” See *Wieg. Arch.* 1848, p. 215, which notices the plates. Carpenter, writing in the *Rep. Brit. Assoc.* for 1856, p. 203, says “plates only have been seen.”

The text of Mamm., Oiseaux, Reptiles, and Poissons was issued in one volume, being v. pt. 1, 21 July, 1855 (*Bibl. Franç.*); but that the dates given above for the Mammals and Birds are correct is indirectly shown by the settings of the text to the former, the spacing being unequal (*e. g.* p. 46) and some blank spaces and pages being left in order to fill up the number of pages that had been allotted when that to the birds was printed off. We think the remaining text is not earlier than 1855, since Valenciennes’s new genus *Smecticus* is not quoted in Duméril’s “*Ichthyologique analytique*” (*Mém. Acad. Sci. Paris*, tom. xxvii. 1856), which was written in 1855.

N.B.—All species are named in the ‘*Table des Planches*,’ which was published in 1846.

BOTANIQUE [=vol. v. pt. 2]. Par J. Decaisne. Not published by July 1855 (see *Bibl. Franç.* 21 vii. 1855). All the plates of Botany were out by 1855, and possibly 1846; the text was issued 3 Sept. 1864 (*Bibl. Franç.*).

---

*The Dates of the 'Faune Française.'*

It may be convenient to put on record the dates of publication of this work. The 'Faune Française' was never finished; these notes therefore provide a collation. The dates given are those recorded in 'Bibliogr. Française.'

Livr. 1 (1 & 2).	31 Mar. 1821.	Coléopt., par Audinet-Serville, pp. 1-96.
2 (3 & 4).	27 July, 1821.	Lépidopt., par St.-Fargeau, pp. 1-96.
5 & 6.	15 June, 1822.	Oiseaux, par Vieillot, pp. 1-96.
7 & 8.	24 May, 1823.	Hyménopt., par Audinet-Serville, pp. 1-96.
9 & 10.	28 Feb. 1824.	Oiseaux, par Vieillot, pp. 97-192.
11 & 12.	7 Aug. 1824.	Araneides, par Walckenaer, pp. 1-96.
13 & 14.	30 Apr. 1825.	Poissons, par Blainville, pp. 1-96.
15 & 16.	28 Oct. 1826.	Oiseaux, par Vieillot, pp. 193-288.
17.	27 Sept. 1828.	Oiseaux, par Vieillot, pp. 289-368.
18.	29 Nov. 1828.	Malacozoaires, par Blainville, pp. 1-80.
19.	31 Jan. 1829.	Mammals, par Desmarest, pp. 1-80.
20.	7 Mar. 1829.	Malac., par Blainville, pp. 81-160.
21.	11 Apr. 1829.	Lépidopt., par St.-Fargeau, pp. 97-176.
22.	30 May, 1829.	Oiseaux, par Vieillot, pp. 369-444.
23.	1 Aug. 1829.	Malac., par Blainville, pp. 161-240.
24.	17 Oct. 1829.	Coléopt., par Audinet-Serville, pp. 81-160.
[N.B.—With livr. 24 was issued "livr. 1 & 2," a reconstructed edition of the 1821 "livr. 1 & 2," and intended to replace it. It consisted of pp. 1-80, of which the signatures read "Faune Française, 1 <sup>re</sup> et 2 <sup>e</sup> livraisons. Coléoptères." In the original "livr. 1 & 2" the signatures read "II. I. I."]		
25.	26 Dec. 1829.	Lépidopt., par St.-Fargeau, pp. 177-256.
26.	20 Mar. 1830.	Araneides, par Walckenaer, pp. 97-176.
27.	8 May, 1830.	Coléopt., par Audinet-Serville, pp. 161-240.
28.	3 July, 1830.	Malac., par Blainville, pp. 241-320.
29.	16 Oct. 1830.	Araneides, par Walckenaer, pp. 177-240.

Or, summarized zoologically, it comes out as follows:—

Mammalia.	Pp.	1-80.	Jan. 1829.
Aves.		1-96.	June 1822.
"		97-192.	Feb. 1824.
"		193-288.	Oct. 1826.
"		289-368.	Sept. 1828.
"		369-444.	May 1829.
Pisces.		1-96.	April 1825.
Coleoptera.		1-96.	Mar. 1821.
"	new ed.	1-80.	Oct. 1829.
"		81-160.	"
"		161-240.	May 1830.
Lepidoptera.		1-96.	July 1821.
"		97-176.	Apr. 1829.
"		177-256.	Dec. 1829.
Hymenoptera.		1-96.	May 1823.
Araneæ.		1-96.	Aug. 1824.
"		97-176.	Mar. 1830.
"		177-240.	Oct. 1830.
Mollusca.		1-80.	Nov. 1828.
"		81-160.	Mar. 1829.
"		161-240.	Aug. 1829.
"		241-320.	July 1830.

*Addenda et Corrigenda to Part I.* ('Annals,' April 1901, pp. 390, 391).

'Voyage aux Indes orientales.'

By an oversight our first instead of our final conclusions were transcribed. It is evident that the sheeting as given by the Bibl. Franç. is wrong, that the latter half of the work came out in well-defined sections, and the last three livraisons were—

- Livr. 6. Pp. 337-440 (Fish & Mollusca). 1832.  
 7. 441-512 (Insecta). 1833.  
 8. 513-end (Zoophytes & Index). 1834.

'Voyage au Pôle Sud.'

Botanique, tom. i. Some copies have a titlepage dated "1842-1845." This was an error of the publishers, as citations in the volume show, and the title in question was evidently withdrawn later. Its date was 1845.

'Voyage sur la Bonite.'

Add :—Géologie et Minéralogie. Par M. E. Chevalier. Date as on titlepage 1844 (Compt. Rend. Acad. Sci. Paris, tom. xix. Sept. 16, 1844, p. 583).

*Corrigenda to my Papers* "*Note on Diatoms from Chinha Guano*" (*Ann. & Mag. Nat. Hist.* vol. vi., 1900) and "*A List of Californian Diatoms*" (l. c. vol. vii., 1901). By C. MERESCHKOWSKY.

I REGRET to say that the dimensions of the diatoms described in the two above-mentioned papers are not quite correct. Through an error in my calculations, which I discovered only lately, all the measures given are 5 per cent. higher than they ought to be \*. In order to make it possible to correct this error I give here a table containing all measures quoted in both papers, accompanied by their real value. This will enable a quick and easy rectification †.

Instead of	read	Instead of	read
0.0015 mm.	0.0014 mm.	0.0077 mm.	0.0073 mm.
0.0024	0.0023	0.008	0.0076
0.003	0.0029	0.0085	0.0082
0.0035	0.0033	0.009	0.0086
0.004	0.0038	0.010	0.0095
0.005	0.0048	0.011	0.0105
0.0052	0.0049	0.0115	0.011
0.0053	0.0050	0.012	0.0114
0.0055	0.0052	0.0125	0.012
0.0058	0.0055	0.013	0.012
0.006	0.0057	0.0133	0.0126
0.0065	0.0062	0.014	0.013
0.007	0.0067	0.0145	0.014
0.0075	0.0072	0.015	0.0143
0.0076	0.0072	0.016	0.015

\* This applies also to the measures given in my paper "*Etudes sur l'Endochrome des Diatomées*," which has recently been published by the Academy of Sciences of St. Petersburg.

† A few measures quoted from other authors need, of course, no rectification.



Instead of	read	Instead of	read
0.017 mm.	0.016 mm.	0.075 mm.	0.0715 mm.
0.0175	0.0166	0.077	0.073
0.018	0.017	0.082	0.078
0.0185	0.0176	0.083	0.079
0.019	0.018	0.084	0.080
0.0195	0.0185	0.085	0.081
0.020	0.019	0.086	0.082
0.0205	0.0195	0.088	0.084
0.021	0.02	0.090	0.0855
0.022	0.021	0.091	0.086
0.023	0.022	0.094	0.089
0.024	0.023	0.096	0.091
0.0245	0.0233	0.097	0.092
0.025	0.024	0.098	0.093
0.0265	0.0252	0.1	0.095
0.027	0.0256	0.117	0.111
0.028	0.0266	0.118	0.112
0.029	0.0275	0.119	0.113
0.031	0.0295	0.120	0.114
0.033	0.031	0.121	0.115
0.035	0.033	0.126	0.120
0.036	0.034	0.127	0.121
0.038	0.036	0.140	0.133
0.040	0.038	0.146	0.139
0.041	0.039	0.150	0.143
0.0417	0.040	0.152	0.144
0.042	0.040	0.161	0.153
0.043	0.041	0.162	0.154
0.044	0.042	0.165	0.157
0.045	0.0427	0.166	0.158
0.0455	0.043	0.175	0.166
0.046	0.0437	0.180	0.171
0.047	0.0445	0.187	0.178
0.049	0.0466	0.188	0.179
0.050	0.0475	0.194	0.184
0.051	0.048	0.196	0.186
0.053	0.050	0.197	0.187
0.054	0.051	0.217	0.206
0.055	0.052	0.224	0.213
0.056	0.053	0.245	0.233
0.0565	0.0535	0.252	0.239
0.057	0.054	0.262	0.249
0.060	0.057	0.267	0.254
0.063	0.060	0.311	0.295
0.064	0.061	0.364	0.346
0.065	0.062	0.437	0.415
0.068	0.065	0.463	0.440
0.069	0.0655	0.483	0.459
0.070	0.0665	0.538	0.511
0.072	0.068		

As another result of this error the magnifications given on the Plates should all be 5 per cent. higher than indicated: these must therefore be changed as follows:—

Instead of	$\frac{300}{1}$	read	$\frac{315}{1}$ .
"	$\frac{600}{1}$	"	$\frac{630}{1}$ .
"	$\frac{900}{1}$	"	$\frac{945}{1}$ .

It is superfluous to say that the scales at the bottom of the Plates are, for the same reason, useless.

I take this opportunity to make a few remarks concerning some of the species mentioned in the same papers:—

*Nitzschia spiralis*, Mer. (Ann. & Mag. Nat. Hist. vol. vii. p. 475).—This name having already been given to another species, must be changed, and I propose to call it *N. contorta*, Mer.

*Tropidoneis elegans* (W. Sm.), Cl. (l. c. p. 299), is by mistake said to have two chromatophore-plates. It has four plates, as all marine species, with the exception of *T. vitrea*, which has only two.

*Climacosphenia pacifica*, Mer. (l. c. p. 508), is the same as *C. elongata*, Bail., at least it does not differ from the figure of that species given by Peragallo (Diat. mar. d. France, pl. lxxxvi. figs. 1–2); the former name has therefore to be dropped.

*Licmophora Monksii*, Mer. (l. c. p. 510), being named after a lady, has to be changed into *L. Monksiae*.

*Rhabdonema* sp. ? (l. c. p. 505. n. 136) is most probably *R. Crozierii* (Ehr.), Grun.

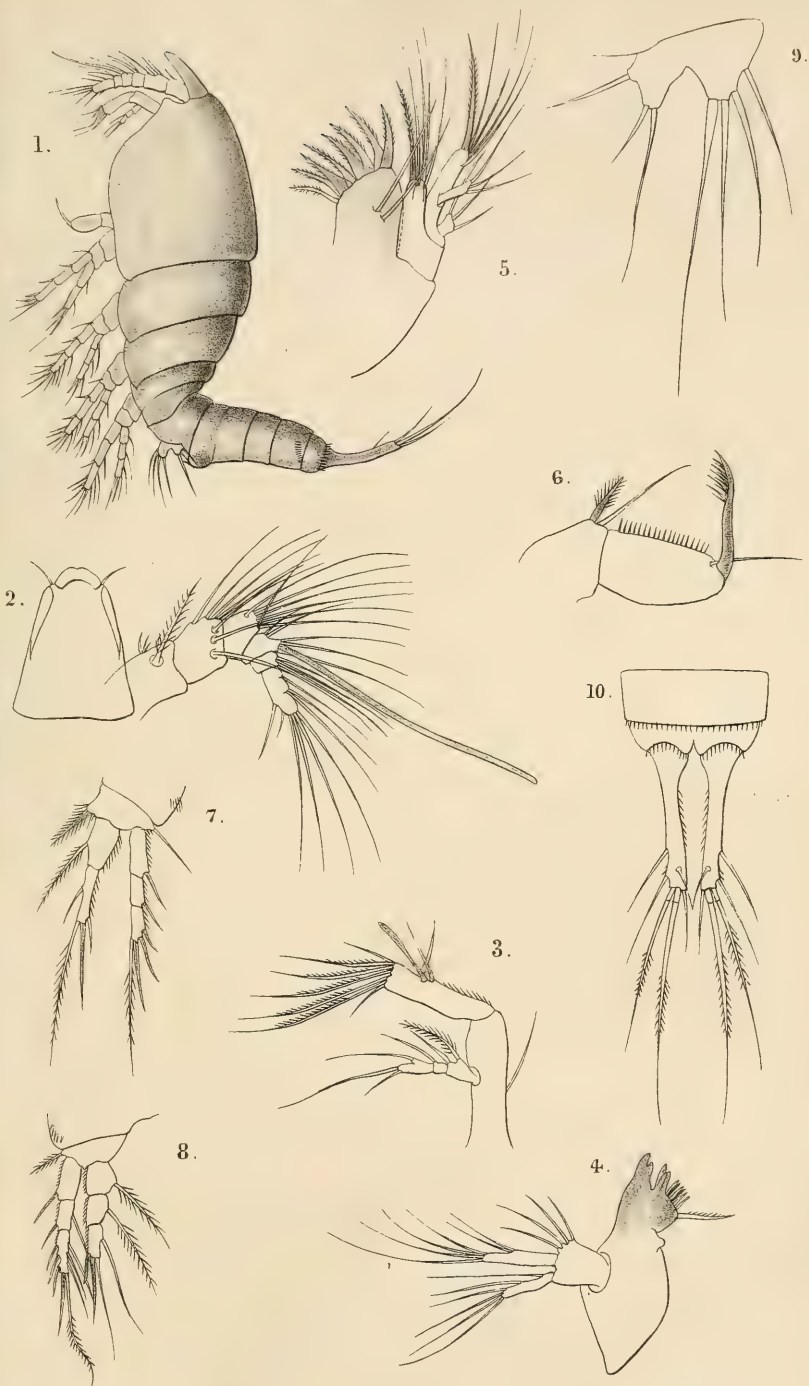
*Biddulphia simplex*, Mer. (l. c. p. 516), should be compared with the species figured by A. Schmidt, 'Atlas,' pl. cxli. figs. 9–11; the latter is, however, different from *B. simplex*, not having the characteristic biarcuate lines. *B. simplex* is also very nearly allied to *B. pellucida*, Castrac. (Diat. Challeng. pl. xxvi. fig. 5), of which it may be a variety.

*Biddulphia Baileyi*, W. Sm. (l. c. p. 516), to be replaced by *B. mobiliensis*. According to Boyer both are identical (other authors distinguish them). The genuine *B. mobiliensis* is not rare in the plankton of San Pedro (Calif.).

*Navicula* (*Libellus*) *hamulifera* (l. c. p. 294), *N.* (*Schizonema*) *avenacea* (p. 293), and *Surirella fastuosa* var. *lata* (p. 480) had better be excluded from the list.

*Asteromphalus malleus*, var. *pacifica*, Mer. (Ann. & Mag. Nat. Hist. vol. vi. p. 487).—When I described this variety I was not in possession of A. Schmidt's 'Atlas.' Having it now, I see (Atl. pl. xxxviii. fig. 3) that this form has already been described by Brébisson under the name of *A. arachne*. As this latter was described first, the species of Wallich should be called var. *mallea*. Schmidt's fig. 4 in plate xxxviii. and fig. 27 in plate cxxxvii. do not, however, resemble *A. arachne*, differing by the rays being broader and a little inflated at the ends; this is never the case in *A. arachne*, of which I have observed quite a number of specimens. It should be distinguished as var. *gazellæ*, Mer.

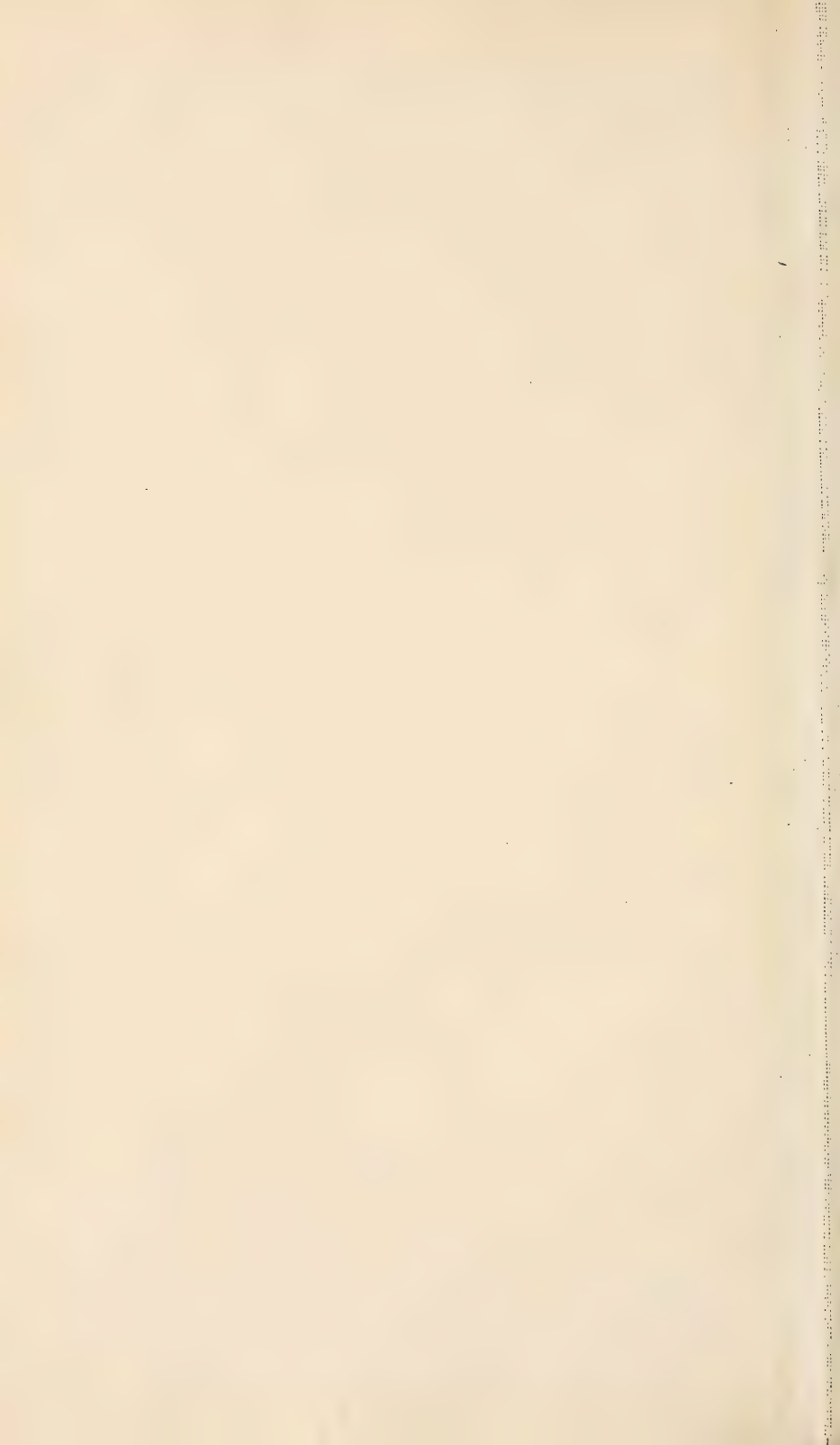
*Skeletonema costatum*, var. *spiralis*, Mer. (l. c. p. 485), has been figured, but neither described nor named, by A. Schmidt, 'Atlas,' pl. clxxx. figs. 36–37.

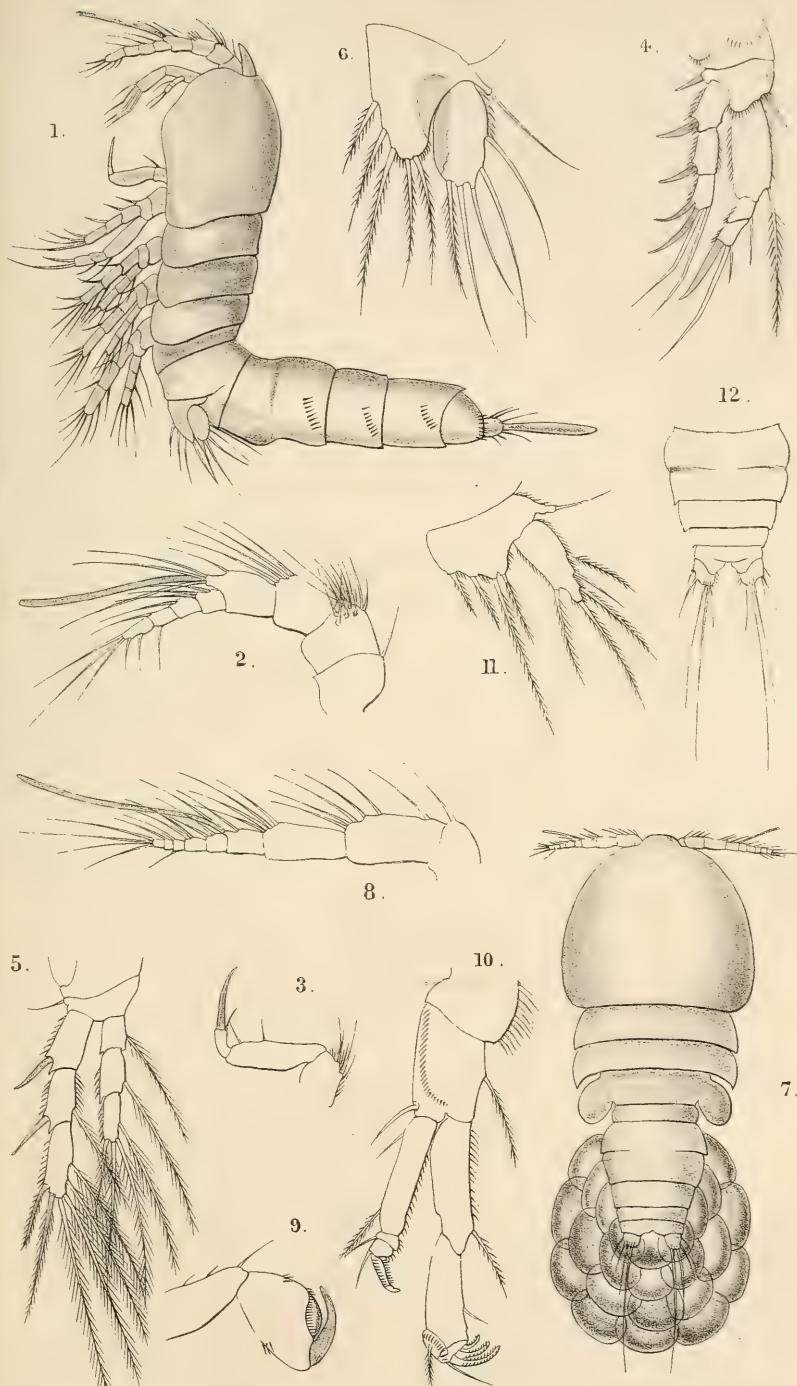


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*JONESIELLA BRUCEI*, n.sp.





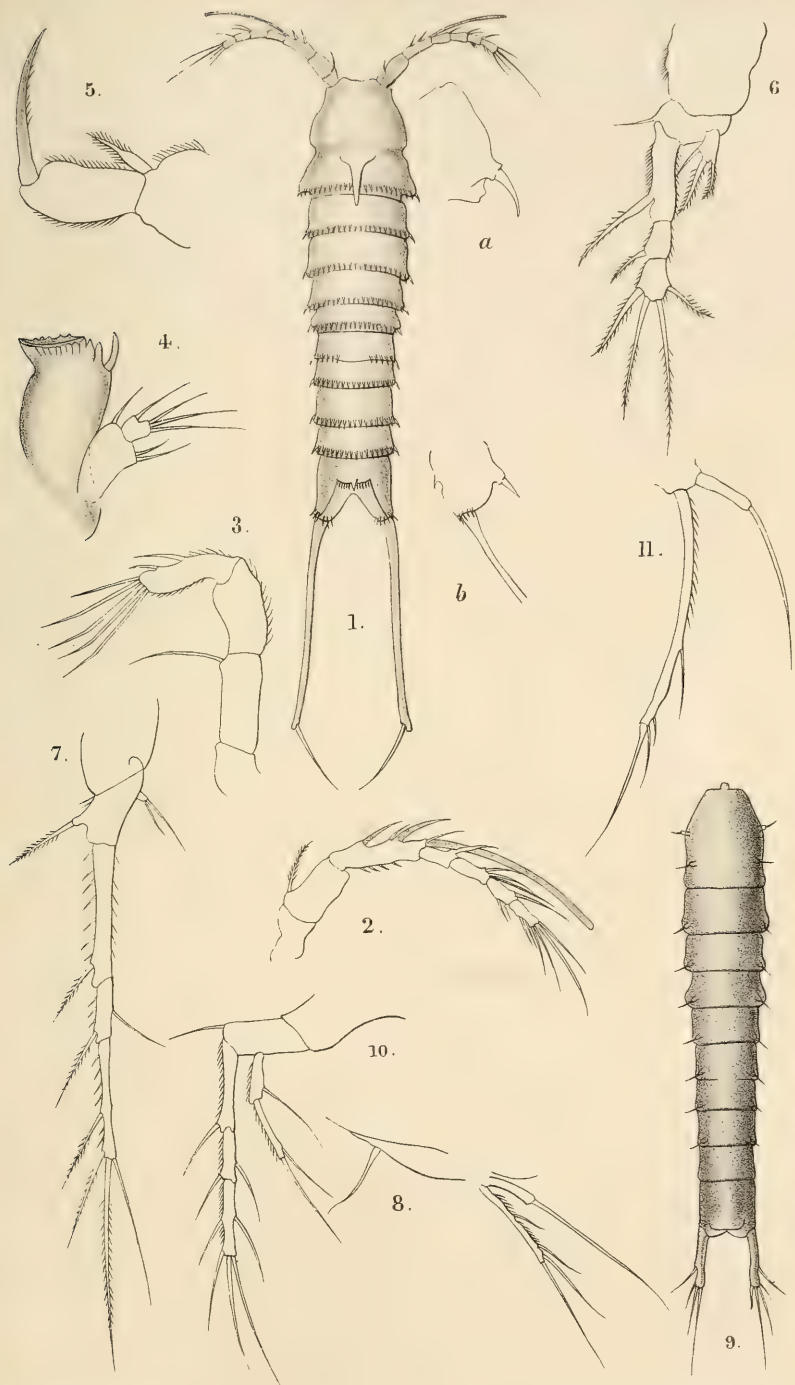
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FIG. 1-6, *DACTYLOPUS BRUCEI*, n.sp. 7-12, *ZAUS AURELII*, Poppe.





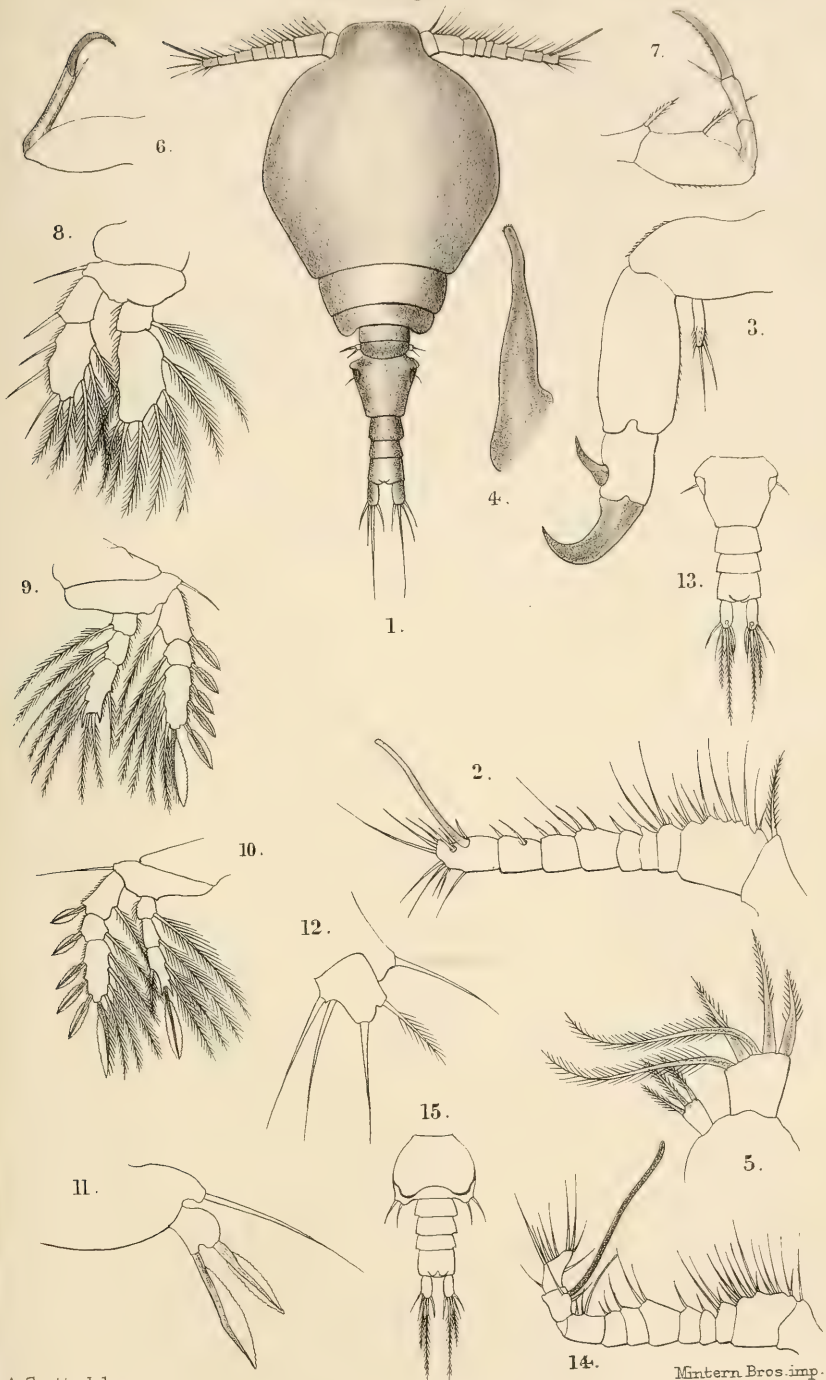


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FIG. 1-8, *CLETODES ABYSSICOLA*, n. sp. FIG. 9-11, *CLETODES BRUCEI*, n. sp.





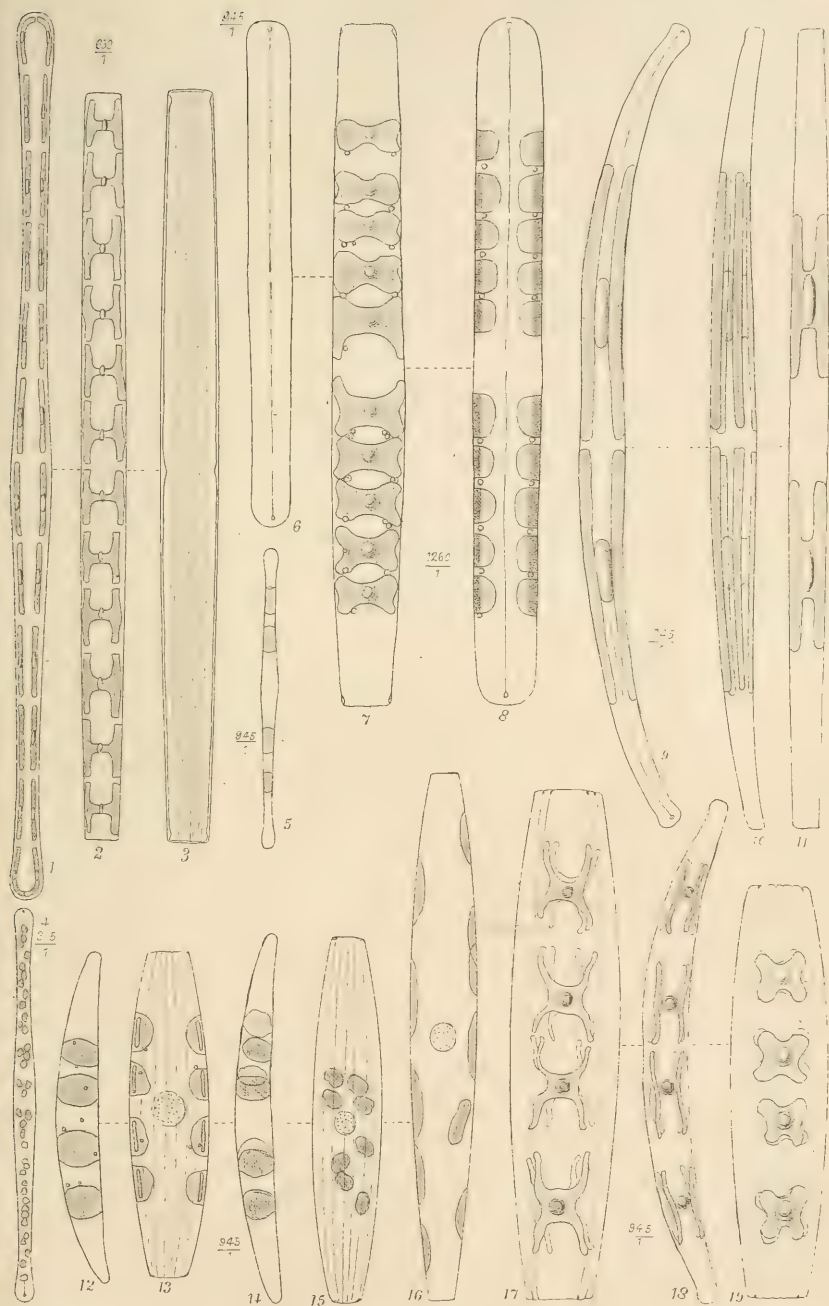
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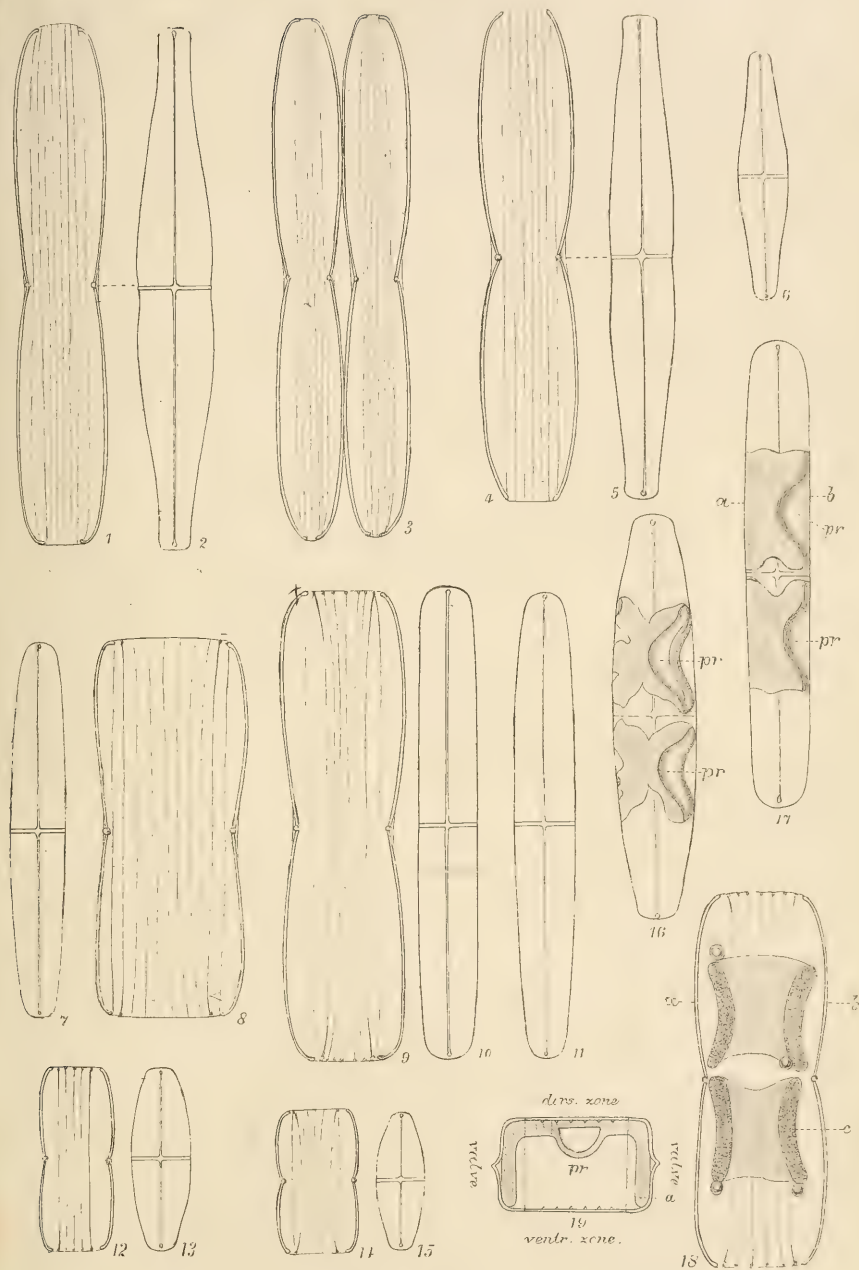
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By J. T. GOODMAN. (Appendix: The Archaic Maya Inscriptions. Pp. i.-xii, 1-150.)

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# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

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LXI.—*Rhynchotal Notes*.—XI. Heteroptera: *Fam. Lygæidæ*.  
By W. L. DISTANT.

[Concluded from p. 486.]

Genus TROPISTETHUS.

*Tropistethus indicus*.

*Aphanus indicus*, Dall. List Hem. ii. p. 559 (1852).

Genus PYGÆUS.

*Pygæus*, Uhler, Proc. Zool. Soc. 1894, p. 187.

*Pygæus pallidus*.

*Pygæus pallidus*, Uhler, Proc. Zool. Soc. 1894, p. 187.

*Salacia picturata*, Uhler, loc. cit. p. 188.

Genus DINIA.

*Dinia sevosus*, sp. n.

Body above shining, oleaginous; head, pronotum, scutellum, and body beneath black; posterior margin of pronotum and the femora castaneous; corium brownish ochraceous with a discal castaneous patch extreme apices of femora, the tibiæ, and tarsi ochraceous; antennæ brownish ochraceous.

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the apices of the first, second, and third joints ochraceous ; a lineate spot on each side of clavus near apex, and lateral margin of corium, luteous.

Antennæ with the second, third, and fourth joints almost equal in length ; pronotum glabrous, scarcely punctate ; scutellum obscurely punctate ; corium, excluding the lateral margins, distinctly punctate ; tibiæ with their bases castaneous and clothed with long spinous hairs.

Long. 4 millim.

*Hab.* Ceylon (*G. Lewis*).

*Dinia trabeatus*, sp. n.

Above shining, glossy ; head, pronotum, scutellum, and body beneath very dark castaneous ; apex of head, antennæ, eyes, anterior margin and lateral angles of pronotum, apex of scutellum, corium, and legs ochraceous ; corium thickly and somewhat darkly punctate ; membrane hyaline.

Scutellum faintly wrinkled and obscurely punctate ; antennæ with the second joint much longer than the third, remainder mutilated.

Long. 4 millim.

*Hab.* India : Nagpur (*Coll. Dist.*).

SINIERUS, gen. nov.

Allied to *Dinia*, Stål, from which it differs in the following particulars :—Head shorter and not equal in length to the pronotum ; basal joint of antennæ passing the apex of the head, third joint not longer than first ; pronotum with a distinct transverse impression, each lobe slightly gibbous, its lateral margins sinuate ; scutellum moderately excavated at base.

This genus is founded on the unique type of *Aphanus capensis*, Dall., a carded specimen, not affording opportunity for full generic diagnosis. It is, however, necessary to properly locate the species, which has hitherto only been enumerated in the "*species incerti generis*" of catalogues.

*Sinierus capensis*.

*Aphanus capensis*, Dall. List Hem. ii. p. 559. n. 3 (1852).

*Hab.* "Cape of Good Hope" (*Drégé's Coll.*, Brit. Mus.).

GENUS ALLOCENTRUM.

*Phoroneus*, Stål, Hem. Afr. ii. pp. 154, 162 (1865), nom. præocc.

*Allocentrum*, Bergr. Ann. Soc. Ent. Belg. xxxviii. p. 547 (1894), n. nom.

*Phoronastes*, Kirkaldy, 'Entomologist,' xxxiii. p. 242 (1900), n. nom.



*SPEUSIPPAS*, gen. nov.

Body oblong ; head long, rather broadly truncate at apex, with a distinct collar and the hinder margin of the eyes well separated from the anterior margin of the pronotum, the head is slightly depressed forwardly and moderately elevated between the eyes ; rostrum reaching the intermediate coxæ, basal joint not produced to eyes ; antennæ with the basal joint considerably passing the apex of the head ; pronotum longer than broad, transversely impressed before middle, anterior lobe convex, narrower than posterior lobe, narrowing to apex, posterior margin slightly concave ; scutellum scarcely longer than broad ; corium with the lateral margins concavely sinuate, membrane passing the apex of the abdomen ; anterior femora somewhat strongly incrassated, with a strong robust spine beneath near centre and from thence to apex finely spinous, intermediate tibiæ less incrassate but spined as in anterior femora.

This genus may be provisionally placed near *Allocentrum* (*Phoroneus*, Stål).

*Speusippas splendens*, sp. n.

Head black ; antennæ ochraceous, the second and third joints more or less piceous ; pronotum with the anterior lobe reddish ochraceous, the posterior lobe piceous with its anterior margin ochraceous ; scutellum black, opaque ; clavus piceous, with a row of punctures on its outer margin not reaching apex ; corium with the anterior half greyish white, followed by a broad, irregular, transverse, black fascia, the apical area brownish ochraceous ; membrane piceous, its apical margin greyish white ; body beneath ochraceous ; head, meso- and metasterna, and apex of abdomen black ; legs ochraceous ; apices of intermediate and posterior femora, bases of intermediate tibiæ, the whole of posterior tibiæ, and the tarsi brownish. The colour of the head, pronotum, base of corium, body beneath, and legs is shining, the remainder more or less opaque ; the anterior lobe of the pronotum is faintly irregularly sculptured ; second joint of antennæ longest ; the body is more or less pilose, especially the antennæ and tibiæ.

Long.  $4\frac{1}{2}$  millim.

*Hab.* Natal (*Gucinzius*, Brit. Mus.).

Genus *LAMPRODEMA*.*Lamprodema coleopteroides*.

*Rhyparochromus coleopteroides*, Walk. Cat. Het. v. p. 108. n. 180 (1872).

Clavus with four series of very distinct coarse punctures.

Walker's specimens were from the Island of Ceram ; the British Museum now possesses a series of specimens brought by Mr. Andrews from Christmas Island.

*Lamprodema tineoides*, sp. n.

Dark castaneous ; head, anterior half of pronotum, and scutellum black ; antennæ, posterior margin and apical angles of pronotum, basal margins of corium, tibiæ, tarsi, and apices of femora brownish ochraceous ; apical joint of antennæ infuscated. Head, anterior area of pronotum, and the scutellum finely punctate ; posterior area of the pronotum and the corium coarsely punctate ; membrane somewhat rudimentary, obscure greyish ; apex of exposed abdomen black.

Long.  $2\frac{1}{2}$  millim.

*Hab.* Ceylon (*G. Lewis*).

*Lamprodema vittata*, sp. n.

Black, the corium somewhat dark castaneous ; posterior lateral angles of the pronotum, basal lateral margins and an inner basal streak to corium, apices of the femora, and the tibiæ and tarsi ochraceous ; claval margin obscurely brownish ochraceous ; basal joint of antennæ black, its apex and the second joint ochraceous, remainder mutilated ; membrane pale greyish.

Head thickly punctate, the basal margin impunctate ; pronotum punctate, about posterior third coarsely punctate, a space on anterior disk almost impunctate ; scutellum punctate, with a central, levigate, longitudinal line ; corium coarsely punctate, the ochraceous markings levigate ; tibiæ very finely and longly spinous, the spines black. Membrane in unique type described (a carded specimen) not reaching the apex of the abdomen.

Long.  $4\frac{1}{2}$  millim.

*Hab.* N.W. Australia : Parry Harbour, C. Bougainville (*J. J. Walker*, Brit. Mus.).

Genus *TRAPEZUS*.

*Trapezus affinis*, sp. n.

*Trapezus fasciatus*, Uhler, Proc. Zool. Soc. 1894, p. 188.

Allied to *T. trimaculatus*, Dist., by having three ochraceous spots to the scutellum, one apical and two lateral ; but differing from that species by having a broad, transverse, black fascia to the corium as in *T. fasciatus*, Dist. In

*T. affinis* the base of the pronotum is widely pale ochraceous at each lateral area, but not connected centrally; femora piceous, with their apices ochraceous.

Long. 3 millim.

*Hab.* Island of Grenada (*H. H. Smith*, Brit. Mus.).

The smallest species as yet described in the genus.

#### Genus PETIZIUS.

##### *Petizius distinctus*, sp. n.

*Petissius diversus*, Uhler, Proc. Zool. Soc. 1894, p. 188.

Differing from *P. diversus*, Dist., by having the head as well as the scutellum and apical area of the corium castaneous; transverse impression to the pronotum more profound; body smaller and more elongate.

Long.  $2\frac{1}{2}$  millim.

*Hab.* Island of Grenada (*H. H. Smith*, Brit. Mus.).

#### Genus APHANUS.

##### *Aphanus sordidus*.

*Cimex sordidus*, Fabr. Mant. ii. p. 302. 231 (1787).

Var. *Rhyparochromus pallens*, Dall. List Hem. ii. p. 567. n. 22 (1852).

*Dieuches pallens*, Leth. & Sev. Cat. Gén. Hém. t. ii. p. 220 (1894).

##### *Aphanus albofasciatus*.

*Beosus albofasciatus*, Stål, Hem. Afr. ii. p. 165 (1865).

*Aphanus albofasciatus*, Leth. & Sev. Cat. Gén. Hém. t. ii. p. 215 (1894).

*Ischnodemus multilinea*, Walk. Cat. Het. v. p. 131. n. 29 (1872).

##### *Aphanus rufocinctus*, sp. n.

Very pale ochraceous, with a rufous tinge; head more or less piceous; anterior area and a very small spot at lateral angles of pronotum, scutellum (excluding apex), two spots on lateral margin of corium, one before and the other at apex, the uppermost sometimes obsolete, castaneous; body beneath testaceous; legs, rostrum, and antennæ ochraceous; membrane pale greyish, somewhat mottled with pale fuscous; apical joint of antennæ infuscated. The posterior lobe of the pronotum and the corium is somewhat thickly punctate, the punctures pale brownish; between the two spots on lateral margin of corium the margin is distinctly levigate.

Long. 4-5 millim.

*Hab.* Perim Island, Gulf of Aden (*J. J. Walker*, Brit. Mus.).

Apparently somewhat allied (by description) to *A. dilutus*, Horv.

*Aphanus australis*, sp. n.

Pale ochraceous; central anterior disk and a spot at each lateral angle of pronotum and scutellum black; basal area of pronotum brownly punctate, centrally castaneous with a median pale ochraceous line; scutellum with the apical margins pale ochraceous; clavus thickly longitudinally punctate, the corium more sparingly so; a small spot near centre of claval margin, a much larger spot at its apex (containing a small ochraceous spot), and two lateral marginal spots (one before and the other at apex of corium) castaneous; membrane very pale fuscous, with some small paler markings; sternum piceous; abdomen beneath dark testaceous, the lateral margins paler; legs ochraceous, anterior femora (excluding apices), and a broad subapical annulation to intermediate and posterior femora, blackish or very dark castaneous; antennæ ochraceous, basal joint and about apical half of fourth joint fuscous. Posterior margin of the pronotum very slightly concave, almost straight.

Long.  $5\frac{1}{2}$  millim.

*Hab.* Troughton Island, N.W. Australia (*J. J. Walker*, Brit. Mus.); Tonga Islands (Coll. Dist.).

*Aphanus papuanus*, sp. n.

Head black, apex of central lobe ochraceous; antennæ with the first and second joints ochraceous, third joint dark castaneous, fourth joint greyishly pubescent. Pronotum with the anterior lobe black, the posterior lobe ochraceous, thickly brownly punctate; lateral margins ochraceous, containing a brown line on anterior half and a black spot, with a minute ochraceous centre, at lateral angles. Scutellum black, its apex narrowly ochraceous; corium ochraceous, thickly brownly punctate, apical third dark castaneous, containing a lateral ochraceous spot, basal half of lateral margin impunctate; membrane pale brownish; body beneath black; lateral margins of sternum and abdomen and the legs ochraceous.

Long. 6 millim.

*Hab.* Queensland: Peak Downs (Coll. Dist.).

A species to be easily recognized by its very distinct markings.

*Aphanus oceanicus*, sp. n.

Head castaneous; antennæ brownish ochraceous, third and fourth joints piceous, extreme base of third and basal half of fourth joints pale luteous; pronotum ochraceous, anterior



lobe very dark castaneous, posterior lobe thickly brownly punctate, lateral margins ochraceous, the lateral angles castaneous; scutellum piceous, the apex and two central discal spots luteous; corium ochraceous, irregularly brownly punctate, with a broad, dark castaneous, transverse fascia near inner angle and the apical margin of the same colour; clavus thickly brownly punctate, with a dark castaneous spot at base; membrane dark castaneous, with a small lateral ochraceous spot near apex of corium; body beneath castaneous, the sternum darkest, lateral, sternal, and abdominal margins (narrowly) and about two central lateral abdominal spots, ochraceous; legs ochraceous, anterior femora (excluding bases and apices), a broad subapical annulation to intermediate and posterior femora, and the apices of the tibiæ very dark castaneous; lateral margins of the pronotum distinctly laminate.

Long. 8-9 millim.

*Hab.* N.W. Australia: Cossack (*J. J. Walker*, Brit. Mus.).

*Aphanus lineosus*, sp. n.

Head, anterior lobe of pronotum, scutellum, and body beneath piceous; posterior lobe of pronotum and the corium ochraceous, thickly brownly punctate; antennæ, lateral margins of pronotum, a narrow central line to the posterior pronotal lobe, two lineate spots near apex of scutellum, lateral margins of corium, two small spots on apical area of outer claval margin, and the legs ochraceous; a spot at lateral marginal angles of pronotum, two spots on apical marginal area of corium, basal halves of anterior femora, and apical thirds of posterior femora piceous or black; rostrum and lateral margins of meso- and metasterna ochraceous; antennæ with the basal joint and apices of second, third, and fourth joints piceous, second and fourth joints of the antennæ about subequal in length, third slightly shorter; punctures of the corium arranged in lineate series.

Long. 6 millim.

*Hab.* Ceylon (*G. Lewis*).

*Aphanus erosus*, sp. n.

Head and antennæ piceous, apex of central lobe brownish ochraceous; pronotum ochraceous, the anterior lobe black, the posterior lobe thickly brownly punctate, the lateral margins pale ochraceous, containing an irregular linear series of intensely coarse black punctures; scutellum black;



corium ochraceous, somewhat thickly brownly punctate, the lateral margins ochraceous, with some very coarse black punctures, a large black spot near inner angles followed by a pale and almost impunctate angular spot; clavus piceous, with its margins, a basal spot, and inner streak ochraceous; membrane piceous, with a small, apical, greyish spot; body beneath piceous, sternal and abdominal margins ochraceous, sparingly brownly punctate; rostrum, anterior margin of prosternum, coxal spots, posterior margin of metasternum, and intermediate and posterior tibiæ dark castaneous; anterior femora black, tibiæ and tarsi ochraceous.

Long. 7 millim.

*Hab.* German East Africa (Brit. Mus.).

Allied to *A. apicalis*, Dall., differing by the exceedingly coarse punctuation on the lateral margins of the pronotum and corium, &c.

#### Genus DIEUCHES.

##### *Dieuches siamicus*.

*Rhyparochromus siamicus*, Walk. Cat. Het. v. p. 102. n. 163 (1872).

##### *Dieuches punctipes*.

*Dieuches punctipes*, Dohrn, Stett. ent. Zeit. xxi. p. 405 (1860).

*Rhyparochromus testaceipes*, Walk. Cat. Het. v. p. 101. n. 160 (1872).

##### *Dieuches erosus*.

*Rhyparochromus erosus*, Walk. Cat. Het. v. p. 113. n. 199 (1872).

##### *Dieuches chinensis*.

*Rhyparochromus chinensis*, Dall. List Hem. ii. p. 566. 20 (1852).

##### *Dieuches pictipennis*.

*Rhyparochromus pictipennis*, Dall. List Hem. ii. p. 571. n. 33 (1852).

##### *Dieuches armipes*.

*Lygæus armipes*, Fabr. Ent. Syst. iv. p. 164 (1794).

*Rhyparochromus armipes*, Dall. List Hem. ii. p. 569. n. 27 (1852).

*Rhyparochromus armatipes*, Walk. Cat. Het. v. p. 91 (1872).

Both Dallas and Walker were wrong in their localizing this specimen as from America. In the British Museum register no locality is given. Dallas was, however, quite right in his specific determination, and the specimen is doubtless an African one.

##### *Dieuches Forbesi*.

*Aspilocoryphus Forbesii*, Kirkaldy, Bull. Liverp. Mus. vol. ii. p. 46 (1899).

*Dieuches relatus*, sp. n.

Black; lateral margins of the pronotum from apex to about one third from base, margins of clavus, and broad lateral areas to corium ochraceous; membrane fuscous; antennæ ochraceous, the basal joint, apices of second and third joints, and apical joint (excluding base) black or dark fuscous; legs and rostrum ochraceous, apex of rostrum, apical thirds of femora, and bases and apices of tarsi black; sternum black; abdomen castaneous, its lateral margins ochraceous.

Anterior femora beneath with a very strong spine a little before apex; the ochraceous lateral areas of the corium sparingly brownly punctate, the extreme lateral margin impunctate.

Long. 10 millim.

*Hab.* Mashonaland: Umfili River (*G. A. K. Marshall*, Coll. Dist.).

Allied to *D. patruelis*, Stål.

## Genus NARBO.

*Narbo longipes*.

*Narbo longipes*, Stål, Berlin. ent. Zeit. x. p. 161 (1866).

*Noliphus*? *distinctus*, Walk. Cat. Het. iv. p. 176. n. 6 (1871).

*Narbo biplagiatus*.

*Noliphus*? *biplagiatus*, Walk. Cat. Het. iv. p. 177. n. 7 (1871).

*Rhyparochromus terminalis*, Walk. loc. cit. v. p. 105. n. 173 (1872).

*Narbo fasciatus*, sp. n.

Head, antennæ, anterior lobe of pronotum, and body beneath black; posterior lobe of pronotum, corium, and disk of abdomen castaneous; posterior lobe of pronotum with a central fascia, its anterior lateral margins, a spot near each lateral angle, and its posterior margin (narrowly) ochraceous; scutellum very dark castaneous, with two small spots near centre and the apex ochraceous; corium with a claval streak (not reaching apex), an outer claval streak followed by a discal spot, a central streak on apical margin, and the whole of the lateral margins ochraceous, a rather large blackish spot at inner angles and a very small spot of the same colour at apical angles; membrane black, opaque, with the basal venation and a central fascia on its posterior half ochraceous; connexivum, legs, rostrum, and basal half of the apical joint of antennæ ochraceous; the head, anterior lobe of pronotum, and sternum are finely greyishly pilose.

Long. 13 millim.

*Hab.* S.E. Borneo (Atkins. Coll., Brit. Mus.).

Genus *PÆANTIUS*.*Pæantius festivus*, sp. n.

Head, antennæ, pronotum, scutellum, and anterior legs pale brownish castaneous; posterior lobe of pronotum a little paler, coarsely brownly punctate, and divided from the anterior lobe by a transverse ochraceous line, on both lobes are indications of a central pale longitudinal line; corium ochraceous, punctate; the clavus, subclaval margin, and apical third pale brownish castaneous, in the last is a small subapical marginal pale spot; membrane pale greyish, its inner angle brown; body beneath, intermediate and posterior legs piceous; bases of intermediate and posterior femora, extreme apical spot to abdomen, lateral margins of meso- and metasterna, posterior margin of metasternum, and anterior coxal spot ochraceous; apical joint of antennæ ochraceous, its apical half piceous.

Long.  $4-4\frac{1}{2}$  millim.

*Hab.* Ceylon (*Green*, Brit. Mus.); Calcutta (Ind. Mus. and Coll. Dist.).

Genus *LETHÆUS*.*Lethæus extremus*.

*Rhyparochromus extremus*, Walk. Cat. Het. v. p. 99. n. 157 (1872).

*Rhyparochromus Greeni*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 100 (1891).

*Lethæus descriptus*.

*Rhyparochromus descriptus*, Walk. Cat. Het. v. p. 103. n. 170 (1872).

*Rhyparochromus alienus*, Walk. loc. cit. p. 105. n. 175.

*Lethæus signatus*, sp. n.

Head and pronotum piceous, the last with two small ochraceous spots on each side of posterior margin; scutellum piceous; corium ochraceous, punctured with brown, a spot near base, a large median patch, and the apex piceous; clavus with two small spots on each side and a subapical spot to corium pale ochraceous; antennæ fuscous, base of first joint, the whole of second joint, and the apex of third joint ochraceous; membrane greyish brown, with the veins darker; body beneath black, legs dark castaneous; lateral margins of sternum, anterior margin of mesosternum, tibiæ, tarsi, and rostrum ochraceous.

Long. 9 millim.

*Hab.* Ceylon (Coll. Dist.).

*Lethæus assamensis*, sp. n.

Dark chocolate-brown; head black; a spot near each anterior angle of the pronotum, two small spots in clavus (one about centre and the other near apex), and two small central spots to corium (one on central disk and the other at apical margin) ochraceous; antennæ fuscous, apical half of third joint ochraceous, fourth joint mutilated; membrane pale brownish; body beneath and legs very dark castaneous; rostrum and tarsi brownish ochraceous

Head opaque, impunctate; pronotum thickly punctate, with two transverse impressions (one angulated near anterior margin, the other straight at about one third from apex); scutellum thickly punctate, corium more sparingly punctate, its lateral margin for more than half from base brownish ochraceous and levigate.

Long. 11 millim.

*Hab.* Assam: Naga Hills (*Doherty*).

*Lethæus maculatus*, sp. n.

Dark chocolate-brown, the corium sometimes a little lighter in hue; a small spot near each posterior angle of the pronotum, a similar spot near each anterior angle of the corium, the apex of the scutellum, and the basal half of the fourth joint of the antennæ ochraceous; second joint of antennæ and base of third joint somewhat paler in hue. Lateral margins of pronotum distinctly laminate.

Long. 5 millim.

*Hab.* Christmas Island (*C. W. Andrews*, Brit. Mus.).

## ARISTÆNETUS, gen. nov.

Head rather long, but shorter than the pronotum; ocelli situate near the eyes, which are well separated from the anterior margin of the pronotum; basal joint of the antennæ moderately incrassated and considerably passing the apex of the head, second joint longest, third subequal to first, fourth mutilated. Rostrum in the female extending to the disk of the second abdominal segment, basal joint about equal in length to the head. Pronotum trapezoidal, narrowing to apex, its lateral margins strongly sinuate; a distinct transverse impression near centre, the anterior lobe somewhat glabrous, the posterior lobe coarsely punctate, the lateral angles rounded, subprominent; scutellum moderately long and triangular; clavus with four series of punctures; venation of membrane as in *Lethæus*, with which the other characters generally agree.

*Aristænetus diffinis*.*Rhyparochromus diffinis*, Walk. Cat. Het. v. p. 110. n. 193 (1872).*Hab.* Australia : Moreton Bay (Brit. Mus.).

## Genus RHAPTUS.

*Rhaptus Uhleri*, sp. n.*Rhaptus collinus*, Uhler, Proc. Zool. Soc. 1894, p. 189.

Differs from *R. collinus*, Dist., by having the body uniformly castaneous above, not with the head and pronotum black; apex of corium with an obscure ochraceous spot; antennæ with the first, second, and third joints ochraceous; pronotum punctate, not levigate.

Long. 3-3½ millim.

*Hab.* Island of Grenada (*H. H. Smith*, Brit. Mus.).

## Genus DRYMUS.

*Drymus bicolor*, sp. n.

Black; corium ochraceous, thickly brownly punctate, membrane pale hyaline. Head, pronotum, and scutellum coarsely punctate; pronotum strongly sinuate at the apices of the transverse impression, lateral margins of the anterior lobe convex, posterior lateral angles slightly nodulose and a little paler in hue; corium coarsely punctate, the lateral margins levigate, the apical angles and a suffusion near inner angle fuscous.

Long. 3½ millim.

*Hab.* Assam : Mungphu (Atkins. Coll., Brit. Mus.).

## Genus — ?

*Rhyparochromus circumcinctus*, Walk. Cat. Het. v. p. 97. n. 147 (1872).

This species is founded on immature forms of a *Lygæid*, and I can say nothing as to the species they belong to or its generic position.

*Summarized Disposition of Walker's Genera and Species.*  
(*Lygæidæ*, omitting Subfam. *Lygæinæ* \*.)

*Species considered valid and described under correct Genera.**Rhyparochromus leucospilus*, Walk. Cat. Het. v. p. 98. n. 155 (1872).— *semilucens*, Walk. loc. cit. p. 99. n. 156.— *maculicollis*, Walk. loc. cit. p. 111. n. 194.*Ischnodemus basalis*, Walk. loc. cit. p. 130. n. 28.

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\* Already summarized; cf. Ann. & Mag. Nat. Hist. (7) vii. p. 531.



*Species considered valid, but requiring generic revision.*

- Heterogaster signifer*, Walk. Cat. Het. v. p. 74. n. 12 (1872), belongs to gen. *Hyginus*.  
 — *cymoides*, Walk. loc. cit. n. 13. Gen. nov.? Condition too bad for exact localization.  
*Rhyparochromus discifer*, Walk. loc. cit. p. 92. n. 118, belongs to gen. *Lygæus*.  
 — *glaberrimus*, Walk. loc. cit. p. 94. n. 122, belongs to gen. *Camptocera*.  
 — *mundulus*, Walk. loc. cit. n. 123, belongs to gen. *Ischnocoris*.  
 — *extremus*, Walk. loc. cit. p. 99. n. 157, belongs to gen. *Lethæus*.  
 — *incisus*, Walk. loc. cit. p. 100. n. 158, " " *Pamera*.  
 — *anticus*, Walk. loc. cit. n. 159, " " *Dieuches*.  
 — *leucoceras*, Walk. loc. cit. p. 101. n. 161, " " "  
 — *siamicus*, Walk. loc. cit. p. 102. n. 163, " " "  
 — *descriptus*, Walk. loc. cit. p. 103. n. 170, " " *Lethæus*.  
 — *obscuripes*, Walk. loc. cit. p. 104. n. 171, " " *Dieuches*.  
 — *repressus*, Walk. loc. cit. n. 172, " " *Pamera*.  
 — *divisus*, Walk. loc. cit. p. 105. n. 174, " " *Hyginus*.  
 — *nigritulus*, Walk. loc. cit. p. 106. n. 176, " " *Pamera*.  
 — *phæophilus*, Walk. loc. cit. n. 177, " " *Navarrus*, g. n.  
 — *luteicornis*, Walk. loc. cit. p. 107. n. 178, " " *Felicianus*, [g. n.  
 — *dimidiatus*, Walk. loc. cit. n. 179, " " *Mizaldus*, g. n.  
 — *coleopteroides*, Walk. loc. cit. p. 108. n. 180, " " *Lamprodema*.  
 — *cincticornis*, Walk. loc. cit. n. 181, " " *Pamera*.  
 — *strictus*, Walk. loc. cit. n. 182, " " "  
 — *rubiginosus*, Walk. loc. cit. p. 110. n. 192, " " *Melanotelus*.  
 — *diffinis*, Walk. loc. cit. n. 193, " " *Aristænetus*, [g. n.  
 — *erosus*, Walk. loc. cit. p. 113. n. 199, " " *Dieuches*.  
*Plociomerus seychellesus*, Walk. loc. cit. p. 120. n. 33, belongs to gen. *Paromius*.  
 — *reductus*, Walk. loc. cit. n. 34, belongs to gen. *Pamera*.  
*Ischnodemus velutinus*, Walk. loc. cit. p. 128. n. 17, belongs to gen. *Papirius*.  
 — *varipennis*, Walk. loc. cit. p. 131. n. 30, belongs to gen. *Macropes*.  
 — *punctatus*, Walk. loc. cit. p. 132. n. 32, " " "  
 — *sulcatus*, Walk. loc. cit. p. 133. n. 33, " " *Spalucocoris*.  
 — *talpa*, Walk. loc. cit. n. 34, " " *Chelochirus*.  
 — *divisus*, Walk. loc. cit. p. 134. n. 35, " " *Macropes*.  
*Ophthalmicus cincticornis*, Walk. loc. cit. p. 138. n. 32, belongs to gen. *Apollonius*, g. n.  
 — *dispar*, Walk. loc. cit. p. 139. n. 33, belongs to gen. *Rhodiginus*, g. n.  
 — *discifer*, Walk. loc. cit. n. 34, " " *Geocoris*.  
*Cymus immunis*, Walk. loc. cit. p. 142. n. 16, " " *Nysius*.  
*Anthocoris proximus*, Walk. loc. cit. p. 152. n. 16, belongs to gen. *Oxy-carenus*.  
 — *pubescens*, Walk. loc. cit. n. 17, belongs to gen. *Oxycarenus*.  
 — *arctatus*, Walk. loc. cit. p. 153. n. 18, belongs to gen. *Oxycarenus*.

*Species treated as synonymic.*

- Heterogaster punctosus*, Walk. Cat. Het. v. p. 72. n. 8 (1872), = *Corizus tigrinus*, Schill.

- Heterogaster notatipes*, Walk. loc. cit. p. 73. n. 9, = *Heterogaster urticae*, Fabr.  
 — *atriclava*, Walk. loc. cit. n. 10, = *Nysius contiguus*, Walk.  
*Rhyparochromus armatipes*, Walk. loc. cit. p. 91. n. 116, = *Dieuches armipes*, Fabr.  
 — *luscinus*, Walk. loc. cit. p. 93. n. 120, = *Dieuches luscus*, Fabr.  
 — *concinulus*, Walk. loc. cit. n. 121, = *Tropistethus seminitens*, Puton.  
 — *testaceipes*, Walk. loc. cit. p. 101. n. 160, = *Dieuches punctipes*, Dohrn.  
 — *delineatus*, Walk. loc. cit. p. 103. n. 169, = *Pamera pallicornis*, Dall.  
 — *terminalis*, Walk. loc. cit. p. 105. n. 173, = *Narbo biplagiatus*, Walk.  
 — *alienus*, Walk. loc. cit. n. 175, = *Lethæus descriptus*, Walk.  
 — *inornatus*, Walk. loc. cit. p. 112. n. 196, = *Pamera nigriceps*, Dall., var.  
*Gastrodes terminalis*, Walk. loc. cit. p. 122. n. 3, = *Clerada apicicornis*, Sign.  
*Ischnodemus multilinea*, Walk. loc. cit. p. 131. n. 29, = *Aphanus albofasciatus*, Stål.  
 — *centralis*, Walk. loc. cit. p. 132. n. 31, = *Macropes spinimanus*, Motsch.  
*Ophthalmicus cinerascens*, Walk. loc. cit. n. 138, n. 31, = *Geocoris tricolor*, Fabr.  
*Cymus truncatulus*, Walk. loc. cit. p. 142. n. 15, = *Ischnorhynchus geminatus*, Fabr.  
*Thaumastopus? alacer*, Walk. loc. cit. p. 147. n. 2, = *Noualhieria quadripunctata*, Brull.  
 — ? *alacris*, Walk. loc. cit. n. 2 (duplicated), = *Cnemodus mavortius*, Say.  
*Anthocoris subcruciatus*, Walk. loc. cit. p. 151. n. 15, = *Oxycarenum maculatus*, Stål.

*To be treated as non-existent.*

*Species the types of which are not now to be found in the British Museum.*

- Rhyparochromus serripes*, Walk. Cat. Het. v. p. 92. n. 117 (1872).  
 — *collaris*, Walk. loc. cit. p. 111. n. 195.  
*Ischnodemus longus*, Walk. loc. cit. p. 127. n. 8.  
*Anisocoris punctifer*, Walk. loc. cit. p. 148. n. 1.  
*Rhyparochromus circumcinctus*, Walk. Cat. Het. v. p. 97. n. 147 (1872), = an immature form of a Lygæid.  
*Ischnodemus strigatus*, Walk. loc. cit. p. 130. n. 27. Type in very bad condition.

LXII.—*List of the Fishes of the Characinid Genus Distichodus*, Müll. & Trosch., with a Key to their Identification.  
 By G. A. BOULENGER, F.R.S.

I. Sq. 37–57  $\frac{7-9}{10-12}$ .

A. Snout not compressed.

1. D. 16–18, separated from the adipose by a space equal to its base.

A. 15–16; Sq. 38–41  $\frac{7}{8-9}$ ; 6 or 7 scales

between lateral line and ventral; caudal

lobes pointed ..... 1. *D. notospilus*, Gthr.

\* The species standing under Walker's name, though not agreeing with description (*Horvath*).

- A. 19-21; Sq. 37-39  $\frac{7}{10}$ ; 7 scales between lateral line and ventral; caudal lobes rounded ..... 2. *D. affinis*, Gthr.
- A. 21-22; Sq. 40-42  $\frac{9}{11-12}$ ; 9 scales between lateral line and ventral; caudal lobes rounded ..... 3. *D. altus*, Blgr.  
 2. D. 20, separated from the adipose by a space equal to  $\frac{2}{3}$  its base.
- A. 16; Sq. 45  $\frac{9}{10}$ ; 8 scales between lateral line and ventral ..... 4. *D. noboli*, Blgr.  
 B. Snout a little compressed; D. 18-19, separated from the adipose by a space equal to its base.
- A. 12-13; Sq. 53-57  $\frac{8}{10-11}$ ; 6 scales between lateral line and ventral ..... 5. *D. hypostomatus*, [Pellegr.  
 II. Sq. 60-110  $\frac{10-20}{13-25}$ .
- A. Snout deeper than long, broad or feebly compressed.  
 1. Sq. 60-78  $\frac{10-15}{13-17}$ .  
 a. D. 19, separated from the adipose by a space nearly equal to its base.
- A. 11; Sq. 70-75  $\frac{9-10}{10-12}$ ; 7 or 8 scales between lateral line and ventral ..... 6. *D. maculatus*, Blgr.  
 b. D. 22-27, separated from the adipose by a space much shorter than its base.  
 a. Interorbital width nearly twice length of snout.
- D. 22; A. 16; Sq. 68  $\frac{13}{15}$  ..... 7. *D. Petersii*, Pfeff.  
 β. Interorbital width not more than  $1\frac{1}{2}$  length of snout.
- D. 22-25; A. 13-15; Sq. 60-66  $\frac{10-12}{12-13}$  ..... 8. *D. Antonii*, Schilth.
- D. 22-24; A. 13-15; Sq. 68-77  $\frac{13-14}{14-15}$  ..... 9. *D. atroventralis*, Blgr.
- D. 25-27; A. 14-16; Sq. 68-78  $\frac{13-15}{14-16}$ ; interorbital width not greater than length of snout ..... 10. *D. fasciolatus*, Blgr.
- D. 26-27; A. 14-16; Sq. 67-69  $\frac{13-14}{13-14}$ ; interorbital width  $1\frac{1}{2}$  length of snout ..... 11. *D. mossambicus*, Ptrs.  
 2. Sq. 80-110  $\frac{15-20}{16-25}$ .
- D. 20-21; A. 13-15; Sq. 80-90  $\frac{17-20}{23-25}$  ..... 12. *D. brevipinnis*, Gthr.
- D. 23-25; A. 14-16; Sq. 85-98  $\frac{15-16}{16-20}$  ..... 13. *D. rostratus*, Gthr.
- D. 23-26; A. 13-15; Sq. 95-110  $\frac{18-20}{20-25}$  ..... 14. *D. niloticus*, L.  
 B. Snout deeper than long, strongly compressed.
- D. 23-24; A. 13; Sq. 80-82  $\frac{14-15}{16-17}$  ..... 15. *D. engycephalus*, Gthr.

- D. 24-25; A. 12-14; Sq. 60-68  $\frac{14-16}{14-16}$  . . . . . 16. *D. sexfasciatus*, Blgr.  
 C. Snout longer than deep, not compressed.  
 D. 24-26; A. 13-14; Sq. 70-85  $\frac{15-18}{15-18}$  . . . . . 17. *D. lusosso*, Schilth.

1. *Distichodus notospilus*.

Günth. Ann. & Mag. N. H. (3) xx. 1867, p. 114; Bouleng. Poiss. Congo, p. 186 (1901).

Gaboon, Ogowé, Congo.

2. *D. affinis*.

Günth. Ann. & Mag. N. H. (4) xii. 1873, p. 144; Bouleng. l. c. p. 187. *D. abbreviatus*, Peters, Mon. Berl. Ac. 1876, p. 845.

Congo.

3. *D. altus*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 80, pl. xxxv. fig. 1 (1899), and l. c. p. 188.

Congo.

4. *D. noboli*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 81, pl. xxxv. fig. 2 (1899), and l. c. p. 189.

Congo.

5. *D. hypostomatus*.

Pellegrin, Bull. Mus. Paris, 1900, p. 351.

Ogowé.

6. *D. maculatus*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 27, pl. xiii. fig. 1 (1898), and l. c. p. 190.

Congo.

7. *D. Petersii*.

Pfeffer, Thierw. O.-Afr., Fische, p. 41 (1896).

Kingani R., German East Africa.

8. *D. Antonii*.

Schilthuis, Tijdschr. Nederl. Dierk. Ver. (2) iii. 1891, p. 89; Bouleng. l. c. p. 191.

Congo.

9. *D. atroventralis*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 28, pl. xiii. fig. 2 (1898), and l. c. p. 192.

Congo.

10. *D. fasciolatus*.

Bouleng. Ann. Mus. Congo, Zool. i. p. 27, pl. xiv. (1898), and *l. c.* p. 193.  
Congo.

11. *D. mossambicus*.

Peters, Mon. Berl. Ac. 1852, p. 275, and Reise n. Mossamb. iv. p. 71,  
pl. xiii. fig. 1 (1868).

*D. schenga*, Peters, *ll. cc.* pp. 276, 74, pl. xiii. fig. 2.

*D. macrolepis*, Günth. Cat. Fish. v. p. 362 (1864).

Zambesi and Shiré River.

12. *D. brevipinnis*.

Günth. Cat. Fish. v. p. 361 (1864), and in Petherick's Trav. ii. p. 247,  
pl. iii. fig. C (1869); Steind. Sitzb. Ak. Wien, lxi. i. 1870, p. 547,  
pl. iii. fig. 1.

White Nile, Senegal.

13. *D. rostratus*.

Günth. Cat. Fish. v. p. 360 (1864), and in Petherick's Trav. ii. p. 246,  
pl. iii. fig. B (1869).

*D. Martini*, Steind. Sitzb. Ak. Wien, lxi. i. 1870, p. 549, pl. iii. fig. 2.

Nile, Senegal, Niger.

14. *D. niloticus*.

*Salmo niloticus*, Linn. in Hasselq. Iter, p. 378 (1757).

*Salmo aegyptiacus*, Gmel. S. N. i. p. 1386 (1788).

*Characinus nefasch*, Lacép. Hist. Poiss. v. p. 274 (1803); Geoffr.  
Descr. Egypte, p. 44, pl. v. fig. 1 (1809).

*Distichodus niloticus*, Müll. & Trosch. Hor. Ichth. i. p. 12, pl. i. fig. 3  
(1845); Günth. Cat. Fish. v. p. 360 (1864).

*Distichodus nefasch*, Cuv. & Val. Hist. Poiss. xxii. p. 175 (1849).

*Distichodus rudolphi*, Günth. P. Z. S. 1896, p. 223; Vinciguerra, Ann.  
Mus. Genova, (2) xix. 1898, p. 258.

Nile, L. Rudolf.

15. *D. engycephalus*.

Günth. Cat. Fish. v. p. 361 (1864), and in Petherick's Trav. ii. p. 247  
(1869).

White Nile.

16. *D. sexfasciatus*.

Bouleng. Ann. & Mag. N. H. (6) xx. 1897, p. 425, and *l. c.* p. 194.

Congo.

17. *D. lusosso*.

Schilthuis, Tijdschr. Nederl. Dierk. Ver. (2) iii. 1891, p. 90; Bouleng.  
*l. c.* p. 195.

*D. leptorhynchus*, Bouleng. Ann. & Mag. N. H. (6) xx. 1897, p. 425.

Congo.

*Distichodus Marnoi*, Steind. Sitzb. Ak. Wien, lxxxiii.  
i. 1881, p. 200, is founded on a specimen of *Citharinus*  
*Geoffroyi*.

*Ann. & Mag. N. Hist.* Ser. 7. Vol. viii.



## LXIII.—On the Genera of Osteoglossidæ.

By G. A. BOULENGER, F.R.S.

IN describing for the first time the remarkable Australian fish *Scleropages Leichardti*\*, Dr. Günther observed that the genus might not be separable from *Osteoglossum*, pointing to the affinity which the species bears to the Malay *Osteoglossum formosum*; and, in fact, he has since withdrawn the genus *Scleropages* altogether, and placed the Australian fish in the same genus with the South American and Malay, a course in which he has been followed by all subsequent writers.

When dealing with the anatomy of *Heterotis*, the late Prof. Hyrtl† made some allusions to the skeleton of an *Osteoglossum*, without naming the species, although in a later paper‡ he incidentally refers to the South-American *Osteoglossum Vandelli* (= *bicirrhosum*) as the species examined by him. Having recently had a skeleton of the latter prepared, I find that the number of vertebræ differs widely (28+59) from that (31+30) given by Hyrtl. On communicating with Prof. Bridge, whose collection in the Birmingham University contains a skeleton of *Osteoglossum formosum* from Borneo, I hear that the specimen has the vertebræ (29+30) corresponding so nearly with the indication of Hyrtl that I have little doubt the notes of this anatomist were taken from that very species, of which examples appear to have been distributed from Leyden about 1845. I am further confirmed in this supposition by the statement of Hyrtl that the branchiostegal rays number seventeen, the number in *O. bicirrhosum* being ten.

*Osteoglossum formosum* and *O. Leichardti* are evidently closely allied species, and I think they should remain in the same genus, but at the same time it appears to me that they deserve to be generically separated from the American *Osteoglossum*. The four recent genera which would then form the Osteoglossidæ may be thus briefly contrasted:—

*Osteoglossum*, *Vandelli*.—Mouth large; vomer, palatines, pterygoids, and glossohyal toothed; mandibular barbels; branchiostegal rays 10; body compressed, with trenchant abdomen; coracoids forming a ventral keel; dorsal fin long; ventral fins nearly twice as far from the caudal as from the

\* Ann. & Mag. Nat. Hist. (3) xiv. 1864, p. 196.

† Denkschr. Akad. Wien, viii. 1854, p. 73.

‡ Op. cit. x. 1855, p. 50.

end of the snout; vertebræ 28 + 59; air-bladder not cellular.—South America.

*Scleropages*, Gthr.—Mouth large; vomer, palatines, pterygoids, and glossohyal toothed; mandibular barbels; branchiostegal rays 15–17; body compressed, with trenchant abdomen; coracoids forming a ventral keel; dorsal fin short; ventral fins nearly equally distant from end of snout and caudal fin; vertebræ 29–31 + 30; air-bladder not cellular.—Australia and Malay Archipelago.

*Arapaima*, J. Müll.—Mouth rather large; vomer, palatines, pterygoids, and glossohyal toothed; branchiostegal rays 16; belly rounded; dorsal fin rather long; ventral fins equidistant from head and caudal fin; vertebræ 37–38 + 41–42; air-bladder cellular.—South America.

*Heterotis*, Ehrenb.—Mouth moderate; branchiostegal rays 7; belly rounded; dorsal fin rather long; ventral fins nearer end of snout than caudal fin; vertebræ 27 + 42–43; air-bladder cellular; fourth branchial arch with an accessory breathing-organ.—Africa.

*Dapedoglossus*, Cope, from the Eocene of Wyoming, appears to be nearest to *Scleropages*, and *Brychaetus*, A. S. Woodward, from the Eocene (London Clay) of Sheppey, Kent, to *Arapaima*, so far as the state of preservation of these fossils enables us to form an opinion\*.

LXIV.—*Description of a new Frog from British East Africa.*  
By G. A. BOULENGER, F.R.S.

*Rana stenocephala*.

Vomerine teeth in two short oblique series commencing from the inner front edges of the choanæ. Head nearly once and a half as long as broad; snout acutely pointed, longer than the diameter of the orbit, strongly projecting beyond the mouth; canthus rostralis feebly marked; loreal region concave; nostril midway between the eye and the end of the snout; interorbital space as broad as the upper eyelid; tympanum distinct, two thirds or three fourths the diameter of the eye. Fingers moderate, obtusely pointed, first not

\* E. D. Cope, Vert. Tert. Form. West, i. p. 68 (1884); A. S. Woodward, Cat. Foss. Fish. iv. p. 74 (1901).

extending beyond second; toes very long and slender, one-third webbed, the web extending to the base or middle of the basal phalanx; subarticular tubercles small; a small, oval, inner metatarsal tubercle; a very small, more or less indistinct, outer metatarsal tubercle. The tibio-tarsal articulation reaches beyond the tip of the snout; tibia about two thirds the length of head and body. Back with six or eight glandular longitudinal folds, outer strongest; a glandular fold from beneath the eye to the shoulder. Olive-brown above, with blackish spots and longitudinal streaks on the body; a black stripe from the tip of the snout to the flank, passing through the eye; a broad orange vertebral stripe; upper lip and outer glandular dorsal fold yellow; no cross-bars on the limbs; lower parts yellowish white, immaculate. Male with two blackish external vocal sacs, projecting through slits below the lower jaw.

From snout to vent 46 millim.

Several specimens from Entebbe, 3800 feet, presented to the British Museum by Sir Harry Johnston, K.C.B.

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LXV.—*On Two new Snakes from Borneo.* By R. SHELFORD, M.A., Curator of the Sarawak Museum.

*Agrophis saravacensis*, sp. n.

Snout obtusely pointed. Rostral large, its breadth nearly equal to its depth; præfrontals large, nearly as long as the frontal; frontal large, rhomboidal, slightly longer than broad, shorter than the parietals. Supraocular and postocular very small; five upper labials, third and fourth entering the eye, fifth largest and forming a suture with the parietal. Anterior chin-shields in contact with the symphyseal and with three lower labials, longer than the posterior chin-shields. Scales in 15 rows. Ventrals 113; anal entire; subcaudals 26. Tail pointed. Dark brown, strongly iridescent; a red blotch on each side of the head just above the angle of the jaw, and an irregular red band on the neck.

Total length 142 millim.

*Hab.* Kuching, Sarawak. The type and only known specimen is deposited in the Sarawak Museum.

The species is allied to *Geophis albonuchalis* (Gthr.)\*, which has recently (Zool. Rec. 1896) been referred by Mr. Boulenger to the genus *Agrophis*.

\* Ann. & Mag. Nat. Hist. ser. 6, vol. xvii. p. 229 (1896).

*Idiopholis Everetti*, sp. n.

Snout short and obtuse. Rostral narrow, deeper than broad; no azygous shield between the internasals; frontal once and a half as broad as long, as long as the præfrontals, less than half as long as the parietals; six upper labials, third and fourth entering the eye, fifth largest and forming a suture with the parietal; anterior chin-shields only slightly longer than the posterior. Scales in 15 rows. Ventrals 133; anal entire; subcaudals 25. Uniform dark bluish grey, ventral surface of head and neck slightly paler.

Total length 155 millim.

*Hab.* Sawa, N. Borneo (*A. Everett*). The only specimen is preserved in the British Museum (Natural History).

The species differs from *I. collaris* (Mocq.) by its broader frontal, by the absence of an azygous shield between the internasals, by its shorter tail, and by its coloration.

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LXVI.—*Natural History Notes from the Royal Indian Marine Survey Ship 'Investigator,' Commander T. H. Heming, R.N., commanding.*—Series III., No. 5. *An Account of the Trawling Operations during the Surveying-season of 1900–1901.* By A. F. McARDLE, B.A., M.B., Capt. I.M.S., Surgeon-Naturalist to the Survey.

DURING the season fourteen deep-sea trawls were made in over 100 fath., of which eleven were in water over 500, and five in water over 1000 fath. deep. This may seem to be no very great number for some months' work, but it must be borne in mind that surveying is the principal work of the R.I.M.S. 'Investigator,' and this takes up so much of her time that trawling must necessarily be to her of secondary importance and relegated more or less to the background. Except, too, when she is on her way to the surveying-ground, or from one surveying-ground to another, she is working between the coast and the hundred-fathom line, rendering deep trawling impossible. A combination of circumstances is thus necessary before deep-sea trawling can be undertaken on the ship—she must be in deep water, have time to spare for the operation, and favoured with fine weather.

Of the collections made during the season the Fishes and the Crustacea (with the exception of the Paguridæ) were worked out during the recess; the Mollusca, Starfishes,



Holothurians, Corals, and Worms remain still to be described and will be subsequently reported on.

On the 10th of October, 1900, the 'Investigator' left Bombay for Calicut to pick up the surveying-party who had been spending the recess at Coonoor. As the 'Investigator' had to take her tender the 'Nancowry' in tow, no trawling could be attempted on the way. On the 13th we arrived at Calicut. From then on to Christmas the ships were busily engaged in their survey between Kundapur on the north, and Mangalore on the south, never going outside the hundred-fathom line. On the 12th of November two very fine specimens of the Indian fin-whale, *Balenoptera indica*, were seen at close quarters, one of them crossing right under our bows. On the 16th of November the trawl was used in shallow water, Sta. 271, in 22 fath.; but, as was to be expected at this depth, the specimens obtained were all well known.

On the 26th of December the 'Investigator' left Mangalore and ran out to sea until deep water was reached, and the next day was devoted to trawling. In the morning the trawl was lowered in 902 fath., Sta. 272. The trawl rapidly filled with mud, and little else was found in the net when it was hauled up. The ship altered her course and ran some distance to the N.E., and sounded in 870 fath. The trawl was then lowered, Sta. 273, and this time proved a little more successful, securing a fair number of starfishes, holothurians, worms, and crustaceans. Among the latter were *Munidopsis stylirostris*, *Hypsophrys superciliosa*, *Glyphocrangon unguiculata*, and *Acanthephyra sanguinea*. That strange fish, *Leptoderma affinis*, was also captured here. On Jan. 2nd the ship left Mangalore for Colombo, trawling *en route*. On the next three days we trawled at Stas. 274, 275, and 276, in 1150, 771, and 1006 fath. respectively. As a rule, the trawl was lowered at 6.30 A.M. and was on deck again before noon. Some very interesting specimens were obtained in these trawls, including *Bathyonus* (*Bazzozetus*) *glutinosus*, *Dermatorus trichiurus*, *Xenodermichthys Güntheri*, a species of *Cyclothone*, and *Odontostomus atratus* among the fishes. The latter was of exceptional interest, inasmuch as the little animal had swallowed another fish almost as large as itself, which plainly showed through its translucent, enormously distensible, gullet. Rare crustaceans were *Lithodes Agassizii*, *Benthescymus Bartletti*, and a new species of *Munidopsis*.

On the evening of the 6th we arrived at Colombo, and left again on the morning of the 9th for our next surveying-



ground south of Negapatam. On the 10th we trawled at Sta. 277 in 859–880 fath. Among the specimens obtained at this station were a new species of *Photichthys* and a *Munidopsis* (*Elasmonotus*) new to science. The next day we sounded and trawled in 1912 fath., Sta. 278. Among the specimens was one of *Sternoptyx diaphana*, which the 'Investigator' had previously dredged in the Arabian Sea off the Malabar coast. The 12th and 13th found the sea too rough to trawl, and we arrived at Negapatam on the evening of the 13th.

From this on to the middle of March surveying-work took up all the time of the ship and left none for trawling. Sometimes on Saturday afternoons, if the week's work had not been a particularly tiring one, we got the Lascars to volunteer to go out seining. Tow-nets were used every night, and the seine-nets of the local fishermen visited and inspected in the hope of finding new or rare species.

On the 18th of March the ship went out for a few days' trawling. Sta. 279, in 300 fath., off Porto Novo, proved very rich, among the fishes captured being *Lamprogrammus fragilis*, *Harpodon squamosus*, *Peristethium investigatoris*, and *Xenomystax trucidans*. There was a large haul of crustaceans, comprising *Munidopsis scobina* (34 specimens), *Munida andamanica*, *Lyreidus Channeri*, *Glyphocrangon investigatoris*, *Ægeon* (*Parapontocaris*) *bengalense*, *Heterocarpus gibbosus*, *Nematocarcinus cursor*, *Aristæus semidentatus*, *Calocaris Alcocki*, a new species of *Calastacus*, *Haliporus æqualis*, and *Pandalus Alcocki*. On March 19th, at Sta. 280, in 446 fath., another successful haul was made. As the net approached the surface numbers of fish shot up out of it and lay on the top of the water. A boat was lowered and about forty were picked up, as they lay with their eyes protruding and air-bladders distended, dead and dying. They were mostly *Macrurus*. Other fishes obtained in this trawl were *Neobythites conjugator*, *Bathyclupea Hoskyni*, *Synagrops philippinensis*, *Dysommopsis mucipara*, *Lamprogrammus fragilis*, and *Saurenhelys tæniola*. The crustaceans were there in great numbers too, including species of *Munida*, *Lyreidus*, *Ethusa*, *Heterocarpus*, *Pandalus*, *Hoplophorus*, *Aristæus*, *Haliporus*, *Hyastenus*, and *Polychæles*, which were fairly common, and *Munidopsis regia*, *Glyphocrangon hastacauda*, and *Psathyocaris infirma*.

Sta. 281, in 300 fath., where we trawled on March 20th, was very similar to Sta. 279, with the addition of *Aphoristia Wood-Masoni*, *Benthobatis Moeresbyi*, and *Neobythites macrops* to the fishes, and *Munidopsis scobina*, *Pasiphæa unispinosa*,

and *Alpheus macroscelus* to the crustaceans. From March 20th to April 2nd the ship was surveying off Point Calimere. On April 2nd we left for Colombo, and on the 3rd we trawled at Sta. 282 in 498-726 fath. The trawl was lowered in 498 fath., and after it was hauled in a sounding showed 726 fath. This rapid deepening of the water perhaps accounts for the very poor results obtained at this Station, for the only interesting specimens obtained were *Nephropsis atlantica* and *N. ensirostris*.

The next day, April 4th, we lowered the trawl in 1086 fath., Sta. 283. The bottom was very foul, and the net came up considerably torn and practically empty. Among the specimens were *Galacantha rostrata* and *Sergestes bisulcatus*.

All the ground round and off the south and east coasts of Ceylon is very interesting and has often yielded valuable results; but the coral and rocky bottom makes trawling very risky work, the trawls are often damaged and sometimes lost in spite of the utmost care, and the nets seldom escape injury.

On April 5th we trawled at Sta. 284 in 506 fath. The trawl came up greatly damaged, the iron framework bent out of all shape and the net torn to pieces. But in the remains of the latter were secured a fine lot of coral and a big collection of starfishes. Among the Crustacea was a new species of *Uroptychus*. The corals included a species apparently identical with the red coral of commerce, *Corallum rubrum*, which has never before been found in these seas.

On April 6th the trawl was lowered for the last time in the season. We had sounded in 1600 fath., and the trawl with 2200 fath. of wire rope was paid out. Shortly after it was all out and the ship going slowly astern, the strain suddenly went up on the accumulator. Orders were immediately given to stop the ship, but before it could be done the rope parted at the near end, and the trawl with over 2000 fathoms of rope was lost. This unfortunate accident finished the trawling for the season, as we had no second rope on board. The 'Investigator' returned to Bombay, and went into dock on May 1st, 1901.

The following is a detailed description of a new species of fish and four new crustaceans. All will be figured in an early issue of the "Illustrations of the Zoology of the 'Investigator.'"

## TELEOSTEI.

## PHYSOSTOMI.

## Family Sternoptychidæ.

## PHOTICHTHYS, Hutton.

*Photichthys Hemingi*, sp. n.

B. 14. D. 10. A. 61. P. 11. V. 9.

Body black, covered with large deciduous scales. The length of the head is about one-seventh the length of the body without the caudal, and a little greater than the height of the body. The eyes are situated very near the anterior profile, about a diameter apart from one another, and are one-sixth the length of the head. There is a double row of small needle-like teeth in the upper jaw, and a single row of similar but smaller teeth in the mandible. A few small teeth in the palatines and vomer, but the latter has no fang. The surfaces of the mesopterygoids minutely denticulate. Gill-openings very wide. Four gills with short laminae and long setose gill-rakers on the first three arches. The dorsal fin is situated above the space between the ventral and anal fins. The latter is extremely long and terminates about an eye-length from the caudal. The pectoral and ventral fins are nearly in the same plane, and the latter are almost midway between the former and the beginning of the anal fin. On the two specimens, one of which is very much damaged and the other by no means perfect, no adipose dorsal fin can be made out. The back is scaly and is not rugose. The luminous organs, which show up a dull opaque white against the dark background, may be grouped as follows:—

- (1) One between the bases of all the branchiostegal rays.
- (2) Sixteen between the symphysis of the jaw and the pectoral fins.
- (3) Eight between the pectoral and the ventral fins.
- (4) Five between the ventral and the anal fins.
- (5) Thirty-five or thirty-six distributed along the bases of the anal rays. The last four groups may be taken as forming the lowest lateral row.
- (6) and (7) A second and a third lateral row join about the ventral fins, and run as a single row of spots to near the caudal fin.
- (8) A fourth row, not so distinct as the others, runs from behind the head to near the termination of the anal fin.

There are one or two glands on the head, one at the anterior angle of, and the other behind, the orbit.

Length 6-8 inches. Two specimens from the Bay of Bengal, 475 and 859-880 fath.

This fish bears several points of resemblance to *Gonostoma maderense* (Johnson, Proc. Zool. Soc. 1890, p. 458), notably in the absence of fangs on the vomer and of an adipose dorsal fin; but in other respects it appears like a true *Photichthys*. It differs from *G. maderense* in having scales on the back and none on the cheek, and in having but a single row of teeth in the anterior portion of the lower jaw. It is quite possible, too, that the small adipose fin may have got rubbed off in the 'Investigator' specimens.

Named after Commander T. H. Heming, R.N., in gratitude for the interest and trouble he has invariably taken in the 'Investigator's' zoological work, and the help he has given to the Surgeon-Naturalist.

## MACRURA.

### Family Thalassinidæ.

#### CALASTACUS, Faxon.

##### *Calastacus longispinis*, sp. n.

*Description of a female*:—Carapace much shorter than abdomen, glabrous, laterally compressed, with the cervical groove well marked and with rounded antero-lateral angles. The rostrum is acutely triangular and short, about one-fourth the length of the remainder of the carapace. A slight but well-marked median carina runs backwards for about two-thirds of the way to the cervical groove, and carries a single blunt spine near its beginning. The margins of the rostrum are spinous, having five teeth on either side in its free portion and two more on their continuation backwards as ridges over the carapace, where they extend as far as the level of the termination of the median carina, enclosing a horseshoe-shaped space. The gastric area supports three small spines on either side arranged in a longitudinal row, midway between the median carina and the continuation of the rostral margins.

Abdomen smooth and naked, the pleura of the first somite rudimentary and overlapped by those of the second, which, like those of the succeeding segments, are large and well developed. The telson is quadrangular and broadly rounded off, as long as the swimmerets, and with a couple of minute



spines along the outer border. The inner caudal swimmeret has a thickened midrib which is spinous and also has a spine at its external angle. The outer swimmeret has two strengthening ridges, a couple of spines along its outer border, and has the edge of the transverse suture serrated.

The eye-stalks are movable, more than half as long as the rostrum, and run horizontally forwards to carry the terminal rudimentary eyes.

The expanded first joint of the antennular peduncle has a small external spine. Flagella equal and moderately long. The basal joint of the antennary peduncle is unarmed; the second joint has a small fixed internal spine and an extremely long external spine (stylocerite), which reaches nearly to the end of the long penultimate joint of the peduncle. The scaphocerite which springs from the base of the second joint is also long and extends for a short distance over the third joint. The third is very long, slender, and unarmed, as is the much shorter fourth joint. Flagellum long.

In the specimen the chelipeds and the fifth pair of legs are unfortunately missing. The second pair is shorter and stouter than the succeeding pairs, and the anterior borders of the ischium, merus, and carpus spinous. The third and fourth pairs are long and slender, the latter pair bent over the back of the carapace; the propodites very long and the dactyli short and setose.

Colour in spirit yellowish white.

A single female specimen, dredged in the Arabian Sea at Sta. 279, in 300 fath.

This species most nearly approaches *C. felix*, but can be readily distinguished by the larger spines on the antennary peduncle, the longer eye-stalks, and the naked body.

## ANOMURA.

### Family Galatheidæ.

#### MUNIDOPSIS, Whiteaves.

#### *Munidopsis orcina*, sp. n.

Carapace rectangular, uniformly rugose, without spines, and with regions well defined. Longer than broad, it is broader in the middle than at either end, and somewhat broader anteriorly than posteriorly. The antero-lateral angles are rounded, and separated from the sides of the carapace by a distinct notch. Rostrum broad, triangular, simple, a little more than a third the length of the remainder



of the carapace, the distal half inclined downwards. It is uniformly curved, with tubercles smaller than those on the carapace. There are no spines on the abdominal terga; those of the second, third, and fourth somites are deeply grooved transversely, the fifth and sixth partly covered with long hair. The basal joint of the antennular peduncle is large and inflated, and both the external spines are large and distinct. The antennary peduncle is small with a short external spine, the flagellum a little longer than carapace and rostrum combined. The eye-stalks have almost disappeared and are fused at the base, and produced into a small spine above the lateral almost immovable eyes.

The external maxillipeds, small and slender, have the ventral borders of the merus obscurely serrated. The chelipeds are about as long as the body and carapace without the rostrum, and one and a half times as long as the second pair of legs. All the joints are coarsely granular, and the merus to the fingers covered with long hair. The ventral border of the ischium is produced and carries a spine, and the distal ends of the merus and carpus are spinose.

The second, third, and fourth legs tuberculate, with spines on the distal ends of their meropodites and on the anterior borders of carpus and propodites; they are more distinct on the second and third than on the fourth pair of legs.

No epipodites on either chelipeds or legs.

Colour in spirit ivory-white.

A single specimen, male, dredged at Sta. 274 in the Arabian Sea, from 1150 fath.

Distinguished from *Elasmonotus longimanus* (A. M.-E.), which it most nearly resembles, by the different shape of the rostrum, the length of the chelipeds, the spine on the orbital peduncle, the long flagellum, and the antennary peduncle reaching well in advance of the almost immovable eyes.

*Munidopsis (Elasmonotus) Sinclairi*, sp. n.

Carapace unarmed, quadrangular, a little longer than broad, and broader anteriorly than posteriorly. Lateral borders parallel, subcristiform, and ending anteriorly in rounded angles. Regions well marked, and the gastric area considerably elevated. Rostrum simple, acutely triangular, nearly half the length of the remainder of the carapace, and with its distal end inclined upwards. The second, third, and fourth abdominal terga are non-spinose, but deeply grooved and carinated transversely; the fifth and sixth smooth, the tergum of the fifth slightly elevated. The base of the antennular peduncle carries two large external spines, and

there are small spines on the distal ends of the second, third, and fourth joints of the antennary peduncle.

The eyes are non-pigmented, non-facetted, and are terminal on the freely movable eye-stalks.

External maxillipeds fairly stout, the inner edge of the ischium is entire, while the ventral border of the merus has two strong teeth. The chelipeds are as long as the carapace minus the rostrum, and nearly twice as long as the second pair of legs. The eggs are small, orange-coloured, and fairly numerous: in the specimen under description there are twenty-five.

A single specimen, an ovigerous female, dredged off the south coast of Ceylon, at Sta. 277, from 880 fath.

It very closely resembles *Elasmonotus cylindrophthalmus*, but it has not got the characteristic eyes of the latter, and the external maxillipeds are different.

Named after Lieut. C. I. Sinclair, Royal Indian Marine, who has been for many years on the R.I.M.S. 'Investigator,' and has shown a naturalist's keenness in the dredging portion of the ship's work.

### Family Galatheidæ.

#### UROPTYCHUS, Henderson.

#### *Uroptychus nanophyes*, sp. n.

Carapace longer than broad, practically smooth, though with the lens minute spines can be made out on the dorsum, especially in the male. The lateral margins are armed with six large spines arranged regularly, three in front and three behind the cervical groove, the posterior three being the larger.

Rostrum horizontal, acutely triangular, half as long as the carapace, and with three or four very small teeth on each side; it extends well beyond the antennular peduncle.

The eyes are well pigmented, terminal, hardly broader than their stalks, and extend about half the length of the rostrum.

The acicle of the antennary peduncle is very long, extending almost as far as the tip of the rostrum in the female, and nearly as far as this in the male. The flagella of the antennules are very unequal, the outer being long and the inner very short.

The chelipeds are very long and strong, twice as long as the body, and over twice as long as the other legs. The ischium has a large spine at its distal end, and two smaller

ones behind on its ventral surface. The merus has three distinct rows of spines on its dorsal surface, of which the internal row is the largest. One ventral row. Distally a crown of spines. The carpus has two small rows of spines, of which the inner is the longer; the hand smooth and not dilated.

The second, third, and fourth pair of legs are short compared with the chelipeds, the second a little longer than the third, and the third than the fourth; the ischium has a single spine, the merus, carpus, and propodus spinous, and the dactyli regularly dentate.

*Measurements:*

	Female.	Male.
	mm.	mm.
Body .....	17	15
Carapace .....	6	6
Rostrum .....	3	3
Chelipeds .....	34	30
Second pair of legs .....	15	13

One male and one female, dredged off the north-east coast of Ceylon in Sta. 284, from 506 fath.

Of the species heretofore described it is most like *Dyptachus intermedius* (A. M.-E.), but it differs from it in having a spiny rostrum, and very unequal flagella on the antennules. The carapace also is more quadrangular in shape.

LXVII.—*On Mammals obtained by Mr. Alphonse Robert on the Rio Jordão, S.W. Minas Geraes.* By OLDFIELD THOMAS.

THE British Museum has recently received from that admirable collector, Mr. Alphonse Robert, a collection of mammals obtained by him on the Rio Jordão, in the district of Araguary, S.W. Minas Geraes, and it has proved to be of such interest as to deserve a general account. Mr. Robert had already sent collections from Piqueté, Cruzeiro, and other localities near the borders of Southern Minas and Eastern São Paulo, collections which proved of the utmost value in identifying species described by Wagner and other older authors, but which had not contained any novelties beyond the *Sciurus Ingrami* described in a previous number of this Journal\*.

The present collection, however, came from a less-known region and included quite a number of new forms. It was

\* Ann. & Mag. Nat. Hist. (7) vii. p. 368 (April 1901).

obtained in the tropical forest bordering the Paranahyba, and therefore no doubt gives a sample of the fauna running northwards along that river into Goyaz.

The collection was made during the months of April, May, and June of the present year. The altitude of the locality is given by Mr. Robert as from 700 to 900 metres.

Mr. Robert's continued success as a collector is a great encouragement to those who have helped him, among whom may be specially mentioned Sir William Ingram and the Hon. Walter Rothschild.

1. *Cebus* sp.

5 ♂.

No doubt *C. cucullatus*, Spix, a name synonymized with various other species by more recent authors. What its proper name should be I cannot at present venture to suggest.

2. *Hapale penicillata*, Kuhl.

2 ♂, 5 ♀.

3. *Myotis nigricans*, Wied.

♂.

4. *Glossophaga soricina*, Pall.

♂, 5 ♀.

5. *Sturnira lilium*, Geoff.

2 ♂.

6. *Canis cancrivorus*, Desm.

2 ♂.

Either of Wagner's two names, *Canis melanostomus* and *C. melampus*, may be represented by these specimens.

7. *Conepatus amazonicus*, Licht.

*Mephitis Westermanni*, Reinh.

♂, ♀.

These specimens, which differ somewhat from each other, are more or less intermediate between the species to which I provisionally refer them and the Uruguayan *C. Feuillei*, Eyd. & Soul. (*C. m. Monzoni*, Aplin). But more specimens are needed before the extent of variation in these different forms can be properly estimated.

In reference to Mr. Howell's suggestion\* that the Patagonian skunk (*Conepatus Humboldti*) ought to be generically separated from the other members of the group, and that these should be called *Thiommus*, it may be pointed out that *Marputius*, Gray, being of the same date as *Conepatus*, would equally antedate *Thiommus* and be available for the present group. Its type was what Gray called "*Mephitis chilensis*, Geoff."; but his specimen (B.M. 68 a) proves to be not the Chilean skunk (*Conepatus chinga*, Mol.), but the Brazilian one and the actual type of Lichtenstein's *Mephitis amazonica*†.

#### 8. *Nectomys squamipes*, Brants.

♂.

#### 9. *Oryzomys subflavus*, Wagn.

672. ♀. 22nd May.

This specimen closely agrees with an example from Lagoa Santa, determined by Winge as "*Calomys laticeps*," the *Mus vulpinus* of Lund, *nec* Brants, renamed *vulpinoides* by Schinz‡; therefore a topotype of that species. But it also precisely agrees with Wagner's "*Hesperomys subflavus*"§, described two years before Schinz's name was published, of which I have examined the type in the Munich Museum. So close is the agreement that my measurements of the typical skull might almost have been taken on Mr. Robert's specimen. The name *vulpinoides* will therefore become a synonym of *subflavus*.

The relationship of this species to *O. anguya*, Desm., remains to be settled when topotypes of the latter are obtained from Paraguay.

#### 10. *Oryzomys lamia*, sp. n.

4 ♂, 2 ♀. May to July.

A fairly large species, of a beautiful ochraceous-buff colour.

\* N. Am. Faun. no. 20, p. 20, footnote (1901).

† Apropos of the name *Conepatus zorilla* given by me to a Peruvian skunk (Ann. & Mag. Nat. Hist. (7) v. p. 217, 1900), I find that the specific name is rendered invalid by "*Mephitis zorilla*," Fisch. Syn. Mamm. p. 162 (1829). The term seems to have been applied to the skunk of the Orinoco, no doubt a *Conepatus*, independently of its earlier use for members of other allied genera. To keep the same general sound I would propose to use the local Spanish name as a substitute—*Conepatus zorrino*.

‡ Syn. Mamm. ii. p. 193 (1845).

§ Wagn. Schr. Säug. Suppl. iii. p. 534 (1843).



Size rather less than in *O. subflavus*. Fur soft, close, and straight; hairs of back about 11 millim. in length. General colour a beautiful ochraceous buff, brilliant and clear on the cheeks, flanks, and hips, more or less lined with black on the back; in the oldest and brightest specimens the middle area of the back is lined and coloured about as in *O. flavicans* (though of a less reddish tinge), but the bright ochraceous buffy of the flanks is unrivalled in any species known to me. Under surface sharply defined white, the bases of the hairs slaty, except just on the chin and scrotal region, where the hairs are wholly white. Head like back, top of muzzle slightly greyer. Ears large, finely haired, pale brown, contrasting but little with the head. Front of fore limbs like body to wrist, remainder and whole upperside of hands white; hind limbs buffy above, the upper surface of the feet also tinged with buffy. Tail nearly naked, the hairs excessively short and fine; unusually finely scaled, the rings running nearly 20 to the centimetre; above brown, beneath white, darkening towards the tip.

Skull heavily built, with broad muzzle and broad inter-orbital region, whose edges are sharply square or have a fine beading along them, but are without overhanging ridges. Palatal foramina rather longer than the molar series, not widely open, their posterior end some distance in front of  $m^1$ . Palate ending some way behind  $m^3$ .

Dimensions of the type, taken in the flesh:—

Head and body 145 millim.; tail 153; hind foot (s. u.) 33; ear 23.

Skull: greatest length 36; basilar length 28·2; zygomatic breadth 19·5; nasals  $15 \times 4\cdot5$ ; interorbital breadth 6·1; palate length 16·4; diastema 9·7; palatal foramina  $6\cdot3 \times 2\cdot3$ ; length of upper molar series 5·5.

*Type.* Male (old). B.M. no. 1. 11. 3. 32. Original number 744. Collected 10th July, 1901.

This beautiful species seems widely different from any *Oryzomys* hitherto described from South Brazil. Perhaps its nearest ally is *O. intermedius*, Leche\*, which is, however, much less brilliantly coloured, and has a slenderer skull with narrower nasals and narrower interorbital region.

Of this latter animal Mr. Robert has sent home, in his earlier collections, quite a series of specimens from Piqueté and Cruzeiro, in the eastern part of São Paulo, the species no doubt ranging along the region of the Serra do Mar, from

\* *Hesperomys laticeps*, var. *intermedia*, Leche, Zool. JB. i. p. 693 (1886).

São Paulo to Rio Grande do Sul. Closely related to it is *O. boliviæ*, described in the succeeding paper.

11. *Oryzomys laticeps*, Lund.

7 ♂, 5 ♀.

These specimens show a considerable amount of variation in colour, especially in the relative proportions of grey and fulvous on the back and sides. Among them there are examples closely agreeing with one from Lagoa Santa determined as "*O. saltator*" by Winge, that being the original *O. laticeps*, Lund.

12. *Oryzomys eliurus*, Wagn.

3 ♂.

13. *Akodon* sp.

5 ♂, 2 ♀.

One of the olive-coloured species of the genus, perhaps *A. brachyurus*, Wagn. Not at present certainly determinable.

14. *Oxymycterus Roberti*, sp. n.

♂.

A member of the large long-snouted group, paler in colour than the other known species.

Size about as in *O. nasutus*. Fur close, straight, and finer, but not hispid; hairs on back about 10 millim. in length, therefore rather shorter than in the allied species. General colour above without iridescence, heavily lined fulvous grey, greyer on the head and fore back, more fulvous on the middle back, where it is slightly more fulvous than Ridgway's "tawny olive." The colour is therefore very different from the deep reddish brown of the other Brazilian species of *Oxymycterus*. Sides paler and greyer. Under surface dull greyish buffy, the bases of the hairs slaty grey, the tips washed with paler yellowish buffy, not marked along the middle line. Line of demarcation on sides not defined. Chin, as usual, white. Snout, centre of face, crown, and nape mixed black and yellowish white, producing a strongly grizzled grey; eyes small, without lighter rings; cheeks washed with pale fulvous. Ears of medium length, thickly hairy, grizzled like the head, with which they are quite concolor. Arms and legs like body; upper surface of hands and feet dull brown; longest anterior claws about 4 millim. in length, measured above, longest posterior about

4.5. Tail finely haired, dark brown as usual, but the hairs of the underside are whitish, imperfectly hiding the brown scales.

Skull with about the same snout-development as in *O. nasutus*, therefore much less than in the large Brazilian forms. Nasals about as wide anteriorly as at their middle, retroussé when viewed from the side, and extending posteriorly some way beyond the premaxillary processes. Interorbital region broad, smooth, and rounded. Outer wall of foramen magnum very narrow. Palatal foramina reaching back to the anterior third of  $m^1$ ; posterior edge of palate level with the back of  $m^3$ .

Upper incisors very narrow. Molars with minute supplementary cusps in the valleys on the outer, but not on the inner, sides.

Dimensions of the type, measured in the flesh:—

Head and body 127 millim.; tail 110; hind foot, s. u. 30, c. u. 33; ear 22.

Skull: bregma to nasal tip 26; zygomatic breadth 15.3; nasals  $13.7 \times 4.5$ ; interorbital breadth 6.7; length of anterior zygoma-root 2.4; palate length 13.6; diastema 8.3; palatal foramina  $7.5 \times 2.8$ ; length of upper molar series 5.2.

Type. Male. B.M. no. 1. 11. 3. 51. Original number 741. Collected 5th July, 1901.

This species may be readily distinguished from any of its allies by its paler colour, without rufous above and less brightly buffy below.

Of other South Brazilian species, I find that the true *O. nasutus*, Waterh., extends northwards from Uruguay at least into Rio Grande do Sul, in which province Dr. H. von Ihering obtained, besides the typical examples of *O. Iheringi*, Thos., specimens indistinguishable from Darwin's typical examples of *O. nasutus*.

### 15. *Proechimys Roberti*, sp. n.

6 ♂, 5 ♀.

Closely similar externally to *P. olivianus*, described in the succeeding paper. Rather brighter and paler coloured, the general colour a richer fulvous, less heavily lined with black. Head not so conspicuously greyer than body. Under surface, inner side of limbs, and upper surface of hands and feet pure sharply-defined white. Tail rather more hairy than in *P. bolivianus*; brown above, whitish below.

Skull smaller than that of *P. bolivianus*, about equalling that of *P. Simonsi*. Nasal region long and narrow. Supra-

orbital ridges abruptly curved outwards posteriorly, and forming distinct postorbital projecting angles; not continued across the parietals. Palatal foramina of medium breadth, broadest at the anterior third, pointed behind, without ridges posteriorly. Posterior palatal opening level with the middle of  $m^1$ , more or less rounded, not very widely open. Basis-occipital very narrow (suture 3 millim.), parallel-sided. Bullæ of medium size.

Dimensions of the type, measured in the flesh:—

Head and body 225 millim.; tail 55; hind foot, s. u. 46, c. u. 49.5; ear 24.

Skull: greatest length 55, basilar length 39; greatest breadth 26; nasals  $21.5 \times 5.2$ ; interorbital breadth 12; palate length 18.5; diastema 11.3; palatal foramina  $6 \times 3.5$ ; length of bullæ 11; length of upper tooth-series 8.1.

Type. Old male. B.M. no. 1. 11. 3. 62. Original number 705. Collected 8th August, 1901.

The present is the first record of this type of *Proechimys* in Eastern or Southern Brazil, and Mr. Robert is to be congratulated on its discovery. It no doubt represents in Southern Brazil the Paraguayan *P. longicaudatus*, Rengger, and the Bolivian *P. bolivianus*. Its cranial characters are remarkably uniform throughout the series examined.

#### 16. *Coendou prehensilis*, Linn.

♀.

#### 17. *Dasyprocta Azaræ*, Licht.

4 ♂, 1 ♀.

As usual there is considerable variation among these specimens in the degree of whiteness or yellowness of the belly.

#### 18. *Agouti paca*, Linn.

♂.

#### 19. *Cavia aperea*, Erxl.

*Cavia aperea*, Erxl. Mamm. p. 348 (1777), based on the "Aperæ" of Marcgrave, Bras. p. 223 (1648).

(Not the *Cavia porcellus* or *C. aperea* of authors in general when referring to the ordinary small wild "Prea" of Brazil, which is *C. rufescens*, Lund, K. Dansk. Vid. Selsk. Afhandl. viii. p. 283, 1841.)

*Cavia leucopyga*, Brandt, Mem. Ac. Petersb. 1835, p. 436, pl. xvi.

2 ♂, 2 ♀.

Somewhat against my will, the study of these specimens



compels me to differ from Dr. Winge's conclusions about the *Cavia* of Brazil, and to agree with those of Lund, quoted above. Mr. Robert's Rio Jordão specimens clearly belong to a species larger and greyer than the ordinary "Prea" of the coast regions, of which Mr. Robert sent home examples in his Cruzeiro and Piqueté collections. In the one case the basilar length is about 54-56 millim., and in the other about 48-50, fully adult individuals only being considered. That the latter never reaches the size of the former is also confirmed by Hensel's statement that the largest skull obtained by him was only 50.6 millim. in basilar length.

Lund observed this difference, and rightly basing his conclusions on Marcgrave's measurement and description, allocated the name *aperea* to the larger form and renamed the smaller *rufescens*. As that of the first distinguisher of the two forms, this allocation must necessarily be followed.

Now, however, that by the recognition of two wild forms the origin of the domestic guinea-pig (*Cavia porcellus*, Linn. S. N. (10) i. p. 59, 1758, based on the *Cavia cobaya* of Marcgrave\*) becomes doubtful, it would be better to restrict the name *porcellus* to the domesticated form only, using for each of the wild forms the names respectively based on them.

Dr. Winge† considered "*C. rufescens*" to be merely the young of *C. aperea*, but he has not noticed the discrepancy in size between his specimens and those of Hensel and others. He has been good enough to give me some measurements of Lund's specimens, which show that the latter undoubtedly obtained the large form now first collected for us by Mr. Robert.

Brandt's *Cavia leucopyga* is nearly certainly this species, presuming that he took "*C. aperea*" in the usual and not in the revised sense. On the other hand, *C. fulgida*, Wagl. ‡, is no doubt very closely allied to *C. rufescens*. Indeed, had it not been expressly stated that it was from the Amazonian journey of Spix, I should have synonymized the two, for its collector was also in the region inhabited by *C. rufescens*.

The Paraguayan guinea-pig (the *Aperea* of Azara and

\* Bras. p. 224 (1648). This affords another instance of what I venture to think is the best way of getting at the primary reference in Linnæus's synonymies. Here Linnæus first quotes his own 'Westgöta Resa,' p. 244 (misprinted 224), and there we find Ray alone quoted. In Ray the primary reference is to Marcgrave, and we thus get at the origin of the name without confusing the discussion with Linnæus's subsidiary references to Aldrovandi, Johnston, Piso, &c.

† E Mus. Lundii, Gnavere, p. 187 (1887).

‡ Isis, 1831, p. 512.



*Cavia Azarae* of Wagner \*) is also a large form closely allied to the true *C. aperea*, as is shown by some topotypical examples recently sent home by Mr. W. Foster. On the other hand, the well-known "Quiso" of Argentina is a small form, but grey in colour, and appears to need a new name. Its description is given in the paper next following.

20. *Sylvilagus minensis*, sp. n.

6 ♂, 4 ♀.

Size decidedly greater than in the true Rio Janeiran *S. brasiliensis*. General colour above dark grizzled buffy, fairly uniform, heavily lined with black on the back, clearer on the sides. Under surface dull whitish, sometimes washed with pale buffy; collar coarsely grizzled buffy, like the sides. Top of muzzle and centre of forehead rufous; nape brighter and clearer rufous. Lower margins of nostrils prominently white. Supraorbital white (or, rather, cream-coloured) lines present, broad in front of and behind eyes, narrowed just over them by a darkened lateral projection of the forehead colour, which comes down nearly to the eyelid. Below the eye there is but little sign of the light marking. Behind, between eye and ear, the cheek is darkened, in some cases almost black. Outer side of ears grizzled like crown basally, dark brown terminally. Hairs of inner surface dull buffy. Forearms and hands rufous anteriorly, white internally; hind limbs similar, but the feet marbled with white above. Tail rudimentary; its hairs grey basally, buffy terminally.

Skull comparatively slender, with a long and narrow muzzle. Interorbital region flat or slightly concave. Postorbital processes long and broad, hollowed out and almost spoon-shaped above; not anchylosing with the brain-case in any of the specimens examined. Occipital shelf narrowing backwards, with convergent sides and rounded posterior angles. Enamel of upper incisors quite simple, following the outline of the teeth.

Dimensions of the type, measured in the flesh:—

Head and body 370 millim.; hind foot, s. u. 75, c. u. 82; ear 54.

Skull: greatest length 72, basilar length 55; zygomatic breadth 35·5; nasals 30 (diagonally)  $\times$  14·4; interorbital breadth 17; breadth of brain-case 27·3; palate length from lenselion 29; diastema 22; palatal foramina  $18 \times 6\cdot7$ .

*Type.* Male. B.M. no. 1. 11. 3. 81. Original number 652. Collected 3rd May, 1901.

\* Schr. Säug. Suppl. iv. p. 63 (1844).

On examining the hares from the region usually said to be inhabited by "*Lepus brasiliensis*," I find that they belong to three different forms—the present one, the largest, from Rio Jordão and Lagoa Santa, a middle one from Paraguay obtained by Mr. Foster, and a very small one from Rio Janeiro. Of the last-named, a fully adult specimen from Porto Real, near Rezende, Rio, has a skull only just 47 millim. in basilar length, with small narrow nasals, and with its postorbital processes firmly welded to the skull posteriorly.

The original *Lepus brasiliensis* of Linnaeus and *L. tapeti* of Pallas were both primarily founded on Marcgrave's Tapeti\*; and since even at that date Rio Janeiro was the chief settlement in this part of Brazil, it would seem best to consider the Rio animal as representing that species. Marcgrave's description is, of course, not worth much; but as to size, his "*dupla magnitudine gliris*" suggests the very smallest conceivable hare. I therefore propose to call the Rio hare *L. brasiliensis* and to give new names to the other two. The Paraguayan one is described below.

Lund and Winge's *Lepus brasiliensis* is the larger Minas species.

## 21. *Mazama rufa*, F. Cuv.

A female skull and two fawns.

## 22. *Tamanduas tetradactylus*, Linn.

♂, 6 ♀.

This series is of much interest, as showing the considerable amount of colour-variation to be found in this group in specimens from one locality. In their general pattern of coloration five of the specimens may be called normal—that is to say, with the head, nape, fore limbs, fore back in the central line, and hind feet light, and the hind back dark with two broad shoulder-straps passing forwards across the humerus. But the dark may be deep black to the roots of the fur, with the underfur also black, or may vary to yellowish white with black tips, the underfur also whitish. Again, the light colour may vary from pale yellowish white to a strong reddish tone.

One specimen alone, no. 739, differs markedly from the rest, and agrees precisely with Cope's "*Myrmecophaga bivittata straminea*"†, to which it is clearly assignable. But

\* H. N. Bras. p. 223 (1648).

† Am. Nat. 1889, p. 132.

whether that is a semi-albinistic form of the common *Tamandua*, or is a recognizable species or subspecies, I am not at present prepared to assert, though I am rather inclined to the former idea. Mr. Robert says that its eyes were not red, but brown with black pupils, and he thought that its ears were a little longer than usual, though his measurements do not show this.

In the skull there is no character by which it could be distinguished from the other specimens. All the skulls are very variable, especially as to the line of the fronto-nasal suture, which may vary from nearly directly transverse to deeply **W**-shaped, and in the relative development of the palatal and pterygoid inflations.

23. *Cabassous unicinctus*, Linn.

2 ♂, 1 ♀.

24. *Dasypus sexcinctus*, Linn.

Skull.

25. *Tatu novemcinctus*, Linn.

2 ♂.

26. *Didelphis Azaræ*, Temm.

♂, ♀.

27. *Marmosa cinerea*, Temm.

♀.

28. *Chironectes minimus*, Zimm.

♀.

LXVIII.—*New Species of Oryzomys, Proechimys, Cavia, and Sylvilagus from South America.* By OLDFIELD THOMAS.

IN working out the Robert collection from the Rio Jordão the following allied species from other localities have proved to need description:—

*Oryzomys boliviæ*, sp. n.

A Bolivian representative of *O. intermedius*; tail shorter and molars smaller.

Size and general proportions as in the allied species.

General colour above heavily lined fulvous brown, clearing into rich fulvous on the sides. Under surface dull white, fairly well defined; the bases of the hairs slaty.

Head greyer and duller above, but cheeks like sides. Ears large, well-haired, wholly dark brown, darker than the head. Outer side of limbs fulvous to wrist and ankles, inner sides white; hands white, feet buffy white. Tail not or scarcely longer than the head and body, very finely haired and scaled, dull whitish below proximally, the upperside and end brown.

Skull very similar to that of *O. intermedius*, with the same narrow muzzle, narrow interorbital region, well-developed zygomatic plate, and medium-sized palatal foramina. But the molars are markedly smaller in all the specimens examined.

Dimensions of the type (measured in the flesh):—

Head and body 148 millim.; tail 150; hind foot (s. u.) 34; ear 25.

Skull: greatest length 34.5; basilar length 27; zygomatic breadth 17.8; nasal, length 14; interorbital breadth 5; palate length 15; diastema 9.8; palatal foramina  $6.5 \times 2.8$ ; length of molar series 4.6.

*Hab.* (of type). Mapiri, Upper Beni River, Bolivia (about  $68^{\circ}$  W. and  $15^{\circ}$  S.). Alt. 800 m. Other specimens from San Carlos (1200 m.) and Chimate (700 m.) in the same district.

*Type.* Old male. B.M. no. 1. 1. 1. 64. Original number 1203. Collected 29th August, 1900, by Mr. Perry O. Simons. Five specimens.

In spite of the wide difference in locality between the habitats of *O. boliviæ* and *intermedius* their resemblance to each other, both external and cranial, is so great that it is practically impossible to distinguish them except by the shorter tail and smaller molars of the new form.

*Proechimys bolivianus*, sp. n.

Most nearly allied to *P. Simonsi*, but larger and different in cranial details.

Size as in *P. brevicauda* and the other large species. Spines about 19 millim. in length and 0.75 millim. in breadth. General colour paler than in *P. Simonsi*, fulvous, heavily lined with black, darker anteriorly, paler posteriorly; a darker patch, as usual, on the middle of the rump. Head duller and greyer than body. Under surface pure well-defined white. Hands and feet dull whitish, rather darker along their outer edges. Tail thinly haired, with large scales, slaty grey above, yellowish white below.

Skull longer than that of *P. Simonsi*. Nasals narrow, evenly rounded behind. Supraorbital ridges normal, not especially heavy, not forming postorbital projections, and, as usual in this group, not crossing the parietals. Palatal foramina open anteriorly, narrowing posteriorly, their combined outline pear-shaped; their edges not continued backwards into ridges. Posterior edge of palate widely V-shaped, the angle of the V opposite the middle of  $m^3$ . Basisoccipital of medium breadth, evenly broadening backwards, narrower than in *P. Simonsi*, broader than in *P. Roberti*. Bullæ decidedly larger than in *P. Simonsi*.

Dimensions of the type (measured in the flesh):—

Head and body 245 millim.; tail 195; hind foot, s. u. 53, c. u. 57; ear 27.

Skull: greatest length 59; basilar length 42.5; greatest breadth 27; nasal length 21.5; interorbital breadth 12; palate length 20.5; diastema 12.5; palatal foramina  $6.3 \times 3$ ; length of bullæ 11.5; length of upper tooth-series 8.8.

*Hab.* Mapiri, Upper Rio Beni, N.W. Bolivia. Altitude 1000 m.

*Type.* Male. B.M. no. 1. 1. 1. 37. Original number 1208. Collected 31st August, 1900, by Perry O. Simons. Eight specimens examined.

Quite a number of forms of *Proechimys* are closely similar to each other externally, and even in the skull only differ from each other by some comparatively trifling character, such as size and shape of the palatine foramina, breadth of basisoccipital, or size of bullæ, yet in these they are locally quite constant. It seems necessary to call them "species," in order to define them at all; but as such they are very unsatisfactory, for they simply cannot be distinguished with any certainty externally. The present animal is closely allied to the Bolivian specimens referred by Günther to *P. brevicauda*\*, a Bolivian skull being figured; but the type of that animal was from the Huallaga, and its belly is quite differently coloured.

*Cavia rufescens pamparum*, subsp. n.

Size of the true *C. rufescens*; colour of *C. aperea*.

General colour above clear greyish, varying to olivaceous grey, lined with black; the head, body, outer side of limbs, and the usual collar all of much the same tone. Belly dull whitish, the bases of the hairs greyish. Interramiae also whitish, which colour is continued upwards and backwards towards the base of the ear.

\* P. Z. S. 1876, p. 749.



Skull markedly smaller than in *C. aperea*, closely like that of the true *C. rufescens*. As compared with that of the otherwise very similar *C. r. guianæ*, the nasals are more evenly pointed behind and there is less tendency towards the formation of postorbital processes.

Dimensions of the type (measured in the flesh):—

Head and body 251 millim.; hind foot (s. u.) 40; ear 23.

Skull: greatest length 62; basilar length 50; greatest breadth 35; nasals  $22 \times 9$ ; interorbital breadth 13.5; palate length 19; length of tooth-row (alveoli) 15; diastema 17.5; palatal foramina 7.

*Hab.* (of type). Goya, Corrientes. Other specimens seen from La Plata and elsewhere in the Argentine Republic.

*Type.* Female. B.M. no. 98.3.6.2. Collected 15th July, 1895, by Mr. R. Perrens.

*Sylvilagus paraguensis*, sp. n.

Closely allied to *S. minensis*, but rather smaller. General colour above similar, but in the two specimens more mottled, though this is probably due to the preparation of the skins. Rufous of top of muzzle less extended on the crown. Supra-orbital light hairs almost obsolete, but the white below the nostrils well marked. Nuchal patch duller rufous. Ears and limbs as described in *S. minensis*. Under surface as in that species, but the dark collar broader, the belly rather whiter, and the groins more distinctly washed with buffy. Tail apparently rather more evident, blackish above, tipped with buffy, yellowish buffy below.

Skull as compared with that of *S. minensis* smaller, markedly shorter and stouter in the muzzle, which is also flatter above in the postnasal region. Postorbital processes more pointed, less concave above. Occipital shelf parallel-sided, not narrowing backwards.

Dimensions of the type (measured in the flesh):—

Head and body 350 millim.; hind foot, s. u. 70, c. u. 76; ear 55.

Skull: greatest length 67.3; basilar length 53; zygomatic breadth 34; nasals 26.5 (diagonally)  $\times 14.1$ ; interorbital breadth 16; breadth of brain-case 26; palate length from henselion 26.2; diastema 20.5; palatal foramina  $16 \times 6$ .

*Hab.* Sapucay, E. of Asuncion, Paraguay.

*Type.* Female. Original number 383. Collected 30th May, 1901, by Mr. W. Foster. Two specimens.

LXIX.—*Some new and old Genera of S.-American*  
*Aviculariidae.* By R. I. POCKOCK.

I HAVE elsewhere shown, in the works cited below, that the most satisfactory basis for a phylogenetic classification of the spiders referred by Simon to the Aviculariinae is furnished by the stridulating-organs, or rather hairy structures that are found between the base of the mandible and palp or palp and first leg. By their structure, in conjunction with other features, the spiders in question fall into a series of natural groups\*, each of which, with the exception of the last, is confined to a definite geographical area.

The following list shows the distribution of these subfamilies and the genera they contain:—

1. ORNITHOCTONINÆ: *Cyriopagopus*, Sim. (= *Omothymus*, Thor.); *Melopæus*, Poc.; *Ornithoctonus*, Poc.; *Citharognathus*, Poc.; and *Phormingochilus*, Poc. (?= *Lampropelma*, Sim., or *Haplopelma*, Sim.).

*Distribution.* Burma and Siam, Celebes and Halmahera.

2. HARPACTIRINÆ: *Harpactira*, Auss.; *Pterinochilus*, Poc.; *Ceratogyrus*, Poc.; and *Eucratoscelus*, Poc.

*Distribution.* East and South Africa from Somaliland to Cape Colony.

For the characters of these genera see Proc. Zool. Soc. 1897, p. 745, and 1898, p. 500.

3. THRIGMOPÆINÆ: *Haploclastus*, Sim., and *Thrigmopæus*, Poc.

*Distribution.* S. India.

For tabulation of the characters see 'Fauna of British India,' Arachnida, p. 184 (1900).

4. SELENOCOSMIINÆ: *Pæcilotheria*, Sim.; *Chilobrachys*, Karsch (= *Musagetes*, Poc.); *Selenocosmia*, Auss. (= *Phlogius*, Sim.); *Lyrognathus*, Poc.; *Phlogiellus*, Poc.; *Coremiocnemis*, Sim.; *Selenotypus*, Poc.; and probably *Orphnæcus*, Sim.

*Distribution.* Oriental Region (India to Australia).

For tabulation of characters of these genera see Ann. &

\* It is a matter of no great moment whether we term these groups subfamilies with the termination *-inæ* or sections with the termination *-eæ*. The main point to be borne in mind is that they are natural and not artificial assemblages like the "Selenocosmiæ," "Chætopelmææ," &c. of Simon, Hist. Nat. Araign. i. (1892).

Mag. Nat. Hist. (6) xv. pp. 169-170 (1895), and 'Fauna of British India,' Arachnida, p. 187 (1900).

5. EUMENOPHORINÆ: *Loxomphalia*, Sim.; *Hysterochrates*, Sim. (= *Hysterochrates* + *Phoneyusa*, Sim. (not *Phoneyusa*, Karsch) + *Lycotharses*, Thor.); *Phoneyusa*, Karsch (=almost certainly *Pelinobius*, Karsch); *Eumenophorus*, Poc.; *Citharischius*, Poc.; *Monocentropus*, Poc.; *Anoploscelus*, Poc.

*Distribution.* Tropical Africa from Sierra Leone and the Congo in the west to Abyssinia and the Zambesi in the east.

For the synonymy and characters of these genera see Proc. Zool. Soc. 1897, pp. 758-773, and 1899, pp. 841-845; Ann. & Mag. Nat. Hist. (6) xv. p. 167, and (7) vi. pp. 489-494.

6. THERAPHOSINÆ: containing a large number of genera, principally confined to America, south of, and including, the Sonoran area, with a few outlying forms in the Mediterranean, Indian, and Tropical African Regions.

This subfamily will probably prove to be capable of finer subdivision. At present it contains a very heterogeneous assemblage of genera, many of which are based upon differences in the size or position of the eyes, the divisional line of bristles on the tarsi, or other unsatisfactory characters. In the following pages I have made use of certain new features, namely, the nature of the hairs clothing the surfaces lying between the palpi and the legs of the first pair which are constant in both sexes, and for the males the method of folding of the protarsus of the first leg with reference to the tibial spurs.

By these characters I find that the so-called genus *Lasiodora* is divisible into several distinct genera, and that under *Eurypelma* have been included species belonging to widely divergent genera. The name *Eurypelma* was affixed by Simon in 1892 to the species erroneously described by Koch as *avicularia*, Linn., and afterwards named *rubropilosum* by Ausserer. I am not aware whether this species is known to Simon; it is unknown to me: nor do I know that Ausserer's specimens were specifically identical with those described by Koch. Koch, however, speaks of the first leg of the male as being furnished on the tibia "mit einem dicken, hakenförmig einwärts gekrümmten borstigen Sporn"—a feature which is characteristic of *Avicularia* or perhaps *Acanthoscurria*, but not of *Eurypelma* as recognized by Ausserer in 1871 and Simon in 1892. In 1864, however, Simon evidently intended to restrict the name *Eurypelma* to a section

including the species subsequently referred by him to *Avicularia* and *Tapinauchenius*. In view, then, of the obscurity in which *Eurypelma* is wrapped, I have ignored it altogether in the following pages as a "*genus ignotum*," at all events for the time being.

Several other genera of the group are unknown to me, e. g. *Planadecta*, *Rhechostica*, *Grammostola*, and *Agathostola*. The latter, however, is certainly nearly allied to *Homæomma*, Auss. (nec *Homæomma*, Sim.) ; and both *Homæomma*, Sim., and *Grammostola*, Sim., are possibly identical with the genus I have described as *Citharoscelus* (Ann. & Mag. Nat. Hist. (7) iii. p. 347, 1899). It is hoped that the types of these genera will be re-examined with reference to the hairy clothing of the base of the legs and palpi, so that they may be established on a securer basis.

### Part I.—*The Genera of the Section "Theraphosæ" of Simon.*

Simon's table of the genera of this section is satisfactory only so far as the male characters are concerned. He admits five genera : *Acanthoscurria*, *Theraphosia*\*, *Sericopelma*, *Xenesthis*, and *Lasiodora*. In my opinion the differences between *Theraphosia* and *Sericopelma* are only of specific importance, whereas the species assigned to *Lasiodora* represent four distinct genera. To these I have to add the new genus *Eupalestrus*, which is, however, merely included here on account of the scopulation of the femur of the fourth leg. It differs from all the known South-American genera in the form of its posterior legs. Until the male comes to hand there is no prospect of locating the genus more accurately.

The males alone may be classified mainly by the structure of the first legs as follows :—

- a. Tibia of first leg without a spur ..... *Theraphosia*.
- b. Tibia of first leg with one or two spurs.
  - a<sup>1</sup>. Tibia of first leg with one spur on the inner side ; a spur on tibia of palp ..... *Acanthoscurria*.
  - b<sup>1</sup>. Tibia of first leg with two spurs, a larger inferior and a smaller superior ; no spur on tibia of palp.
    - a<sup>2</sup>. Protarsus of first leg closing on the outer side of the lower spur.
    - a<sup>3</sup>. A stridulating-organ between the base of the palpus and first leg ..... *Phormictopus*.
    - b<sup>3</sup>. No stridulating-organ in this position. . . . *Megaphobema*.

\* I here adopt Dahl's name instead of "*Theraphosa*," Walck., the destiny of which has yet to be settled.



- b*<sup>2</sup>. Protarsus of first leg not closing outside the lower spur.  
*a*<sup>4</sup>. Protarsus of first leg closing on the summit of the inferior spur; a stridulating-organ between the palpus and first leg ..... *Lasiodora*.  
*b*<sup>4</sup>. Protarsus of first leg closing between the two spurs; no stridulating-organ present.  
*a*<sup>5</sup>. Protarsus of fourth leg scopulate to base. *Xenesthis*.  
*b*<sup>5</sup>. Protarsus of fourth leg scopulate apically. *Pamphobeteus*.

The females may be analyzed as follows:—

- a*. Fourth leg much thicker and stronger than first, the tibia as thick as the femur; the tibia and protarsus strongly hirsute, the latter convex above at the base ..... *Eupalestrus*, nov.  
*b*. Fourth leg not thicker than first, the tibia much thinner than the femur; protarsus slender, cylindrical.  
*a*<sup>1</sup>. A stridulating-organ, consisting of clavate plumose bristles, between the basal segments of the palpus and of the first leg.  
*a*<sup>2</sup>. A cluster of stridulating-bristles upon the trochanters of the palpus and first leg.  
*a*<sup>3</sup>. No stridulating-bristles upon the coxæ of palpus and first leg ..... *Acanthoscurria*.  
*b*<sup>3</sup>. Stridulating-bristles upon the coxæ of the palp and first leg ..... *Phormictopus*.  
*b*<sup>2</sup>. The stridulating-organ consisting of a cluster of clavate bristles above the suture of the coxa of the first leg and of spines upon the adjacent area on the coxa of the palpus, none upon the trochanters ..... *Lasiodora*.  
*b*<sup>1</sup>. No stridulating-bristles present between the bases of the first leg and palpus.  
*a*<sup>4</sup>. Protarsus of fourth leg scopulate to base . . . *Xenesthis*.  
*b*<sup>4</sup>. Protarsus of fourth leg scopulate at its distal end.  
*a*<sup>5</sup>. Femur of third leg enormously swollen; fourth leg much longer than first ..... *Megaphobema*.  
*b*<sup>5</sup>. Femur of third leg not swollen; fourth leg longer than first by about the length of the tarsus; the patella+tibia of the fourth leg at most a little longer than the first ..... *Theraphosia* and *Pamphobeteus*.

### Genus ACANTHOSCURRIA, Ausserer, emend.

- Acanthoscurria*, Auss. Verh. z.-b. Wien, xxi. p. 205 (1871); Simon, Hist. Nat. Araign. i. p. 157 (1892).  
*Acanthopalpus*, Auss. Verh. z.-b. Wien, xxi. p. 207 (1871).  
*Callyntropus*, Auss. Verh. z.-b. Wien, xxv. p. 181 (1875).

In this genus there is a stridulating-organ consisting of



many, sometimes clavate, sometimes attenuate, stout plumose bristles upon the posterior side of the trochanter of the palp, and a corresponding cluster of plumose, mostly attenuate spines, intermixed with one or two simple spines, on the anterior surface of the trochanter of the first leg.

The discovery of these organs enables the females of this genus to be classified. Previously the genus was recognizable mainly from the characters of the male sex.

I have added the name *Callyntropus* to the synonymy of *Acanthoscurria* on the supposition that the former is based upon specimens in Keyserling's collection which Ausserer determined as *Callyntropus convexus*, C. Koch, *convexus* being cited as the typical species of *Callyntropus*. There is, however, no evidence beyond Ausserer's opinion, of which the value is more than doubtful, that this specimen is co-specific with *Eurypelma convexa*, C. Koch. Nevertheless, I presume that the genus must rest upon the species represented by the specimens examined and diagnosed by Ausserer. As I have already pointed out (Ann. & Mag. Nat. Hist. (6) xv. p. 226, 1895), the division of the tarsal scopula in *Callyntropus* is nothing but a sign of immaturity.

#### Genus LASIODORA, Koch, emend.

(=*Lusiodora*, Koch, Ausserer, and Simon in part.)

This genus, as recognized by Ausserer and Simon, I find to be capable of severance into four distinct genera: *Lasiodora* (*sensu stricto*, type *L. Klugii*), *Pamphobeteus*, nov. (type *L. nigricolor*, Auss.), *Megaphobema*, nov. (type *L. robustum*, Auss.), and *Phormictopus*, nov. (type *L. cancerides*, Latr., = *Erichsonii*, Koch).

Out of the crowd of species referred by Koch to *Lasiodora*, Simon has selected *L. Klugii* as the type. Specimens of this species in the British Museum from Brazil (Iguarassu, São Paulo, &c.) and from Recife and Cabo in the Argentine have plumose stridulating-bristles upon the coxa of the palp and of the first leg as in *Citharoscelus*.

The stridulating-organ consists of a cluster of a dozen or more stout, mostly acuminate, plumose spines above the suture on the coxa of the first leg, and of some spinules rising from amongst plumose hairs upon the posterior side of the coxa of the palp. The coxa, trochanter, and femur of palp are scopulate behind, those of the first leg scopulate in front; the femur of the second leg is also scopulate in front, those of the third and fourth scopulate behind.

The protarsus of the first leg in the male closes against

the apex of the lower spur on the tibia, without touching the upper spur.

The different distribution of *L. Klugii* as compared with the other species hitherto referred to *Lasiodora* is to be borne in mind.

#### Genus PHORMICTOPUS, nov.

Resembling *Acanthoscurria* in the presence, position, and structure of its stridulating-bristles upon the trochanter of the palp and first leg; but with an additional cluster of clavate plumose bristles above the suture on the coxa of the first leg and in a corresponding position upon the posterior side of the coxa of the palp; also like that genus in the hairiness of the summit of the rostrum, and other structural characters, except that in the male there are two normal tibial spurs on the first leg and no spurs on the tibia of the palp.

The two species I refer to this genus were included by Ausserer in *Lasiodora* of Koch, and both fall into that genus as diagnosed by Simon; but they differ from all the other species in having the stridulating-bristles on the trochanter of the palp and first leg. They further differ from *Lasiodora* (*sensu stricto*), and from that section that I call *Pamphobeteus*, in that the protarsus of the first leg in the male closes on the outer side of the lower tibial spur—a feature in which they agree with the one known species of *Megaphobema*.

The type of this genus is the species represented in the British Museum by specimens from Haiti, identified as *Mygale cancerides*, Latreille\*, which I believe to be the oldest name for the spider called *Eurypelma Erichsonii* by Koch.

*Lasiodora cauta*, Auss., also falls into this genus.

#### Genus PAMPHOBETEUS, nov.

Differing from *Lasiodora*, as typified by *L. Klugii*, in having no stridulating-bristles on the anterior side of the coxa of the first leg and on the posterior side of the coxa of the palp and no scopula on the inner side of the femur of the first leg.

Protarsus of first leg in male closing between the tibial spurs, thus coming into contact with the inner side of the lower spur and the outer side of the upper spur. Femur of third leg not thickened; patella + tibia of fourth only slightly longer than of first, which, at least in the female, falls short

\* *Mygale cancerides*, Latreille (Gen. Crust. et Ins. i. p. 83, 1806), was originally recorded from St. Domingo (Haiti).

of the fourth by only about the length of the tarsus of the latter.

Type *Pamphobeteus nigricolor*, Auss. (sub *Lasiodora*).

*Hab.* Colombia, Ecuador, and Bolivia.

#### Genus MEGAPHOBEMA, nov.

Differing from *Pamphobeteus* in that the protarsus of the first leg in the male closes on the outer side of the lower tibial spur without coming into contact with the upper spur. Moreover, in both sexes the femur of the third leg is much swollen and the third and fourth legs are longer and stronger as compared with the first and second, the patella + tibia of fourth being much longer than of first, and the latter falls short of the length of the fourth by the tarsus and nearly half the protarsus in the female.

Type *Megaphobema robustum* (Auss.) (sub *Lasiodora*).

*Hab.* Llanos, Sta. Fé de Bogotá.

#### Genus XENESTHIS, Simon.

*Xenesthis*, Simon, Act. Soc. Linn. Bord. 1892, p. 332; Hist. Nat. Araign. i. p. 160 (1892).

As in *Pamphobeteus* and *Megaphobema*, this genus has no stridulating-organs at the base of the palpus and first leg. The protarsus of the first leg in the male passes when closed between the two tibial spurs as in *Pamphobeteus*, and, as in the two genera just mentioned, the femur of the fourth leg is covered with a scopula on its inner side. Distinctive of the genus is the scopulation of the protarsus of third and fourth legs right up to the base.

Type *Xenesthis immanis*, Auss. (= *colombiana*, Simon).

#### Genus EUPALÆSTRUS, nov.

Differing from the rest of the genera of this section in the form of the fourth leg, which is considerably longer than the first and thicker, the tibia being as thick as the femur, only a little more than twice as long as thick, and, like the protarsus, studded with stiff erect bristles; the protarsus is convexly elevated at the base, as high as wide, and about three times as long as high.

Tibiæ and protarsi of first and second legs spined apically beneath, the tibia with one submedian spine on the inner side; tibiæ and protarsi of third and fourth with many spines; protarsus of third with its distal half scopulate, of fourth scopulate only on the distal fifth of its length. First leg

with the anterior side of its coxa thickly clothed with setæ, that of the trochanter and femur scantily scopulate; trochanter of palpus lightly scopulate behind. Thoracic fovea transverse, as wide as the ocular tubercle, which is one-fourth wider than long; eyes of anterior line moderately procurved, the posterior edge of the laterals about on a level with the centre of the medians, which are in front of the middle of the ocular area, rather larger in area than the laterals, and less than a diameter apart in a dried specimen. *Labium* and adjacent area of *maxillæ* thickly cuspluate. *Sternum* with marginal sigilla.

Type *Eupalæstrus pugilator*, sp. n.

*Eupalæstrus pugilator*, sp. n.

♀ (dry, somewhat faded).—Dorsal integument covered with mouse-brown hairs, darker beneath, a narrow rim of pale hairs at the distal end of the leg-segments.

*Carapace* about one-fourth longer than wide, moderately elevated in front; a little longer than patella + tibia of fourth or of first leg, the width equal to those of the second leg, the length equal to protarsus + tarsus of fourth; length from fovea to anterior border equal to protarsus of fourth.

*Measurements in millimetres*.—Total length 56; length of carapace 22, width 17.5; length of first leg 52, second 46, third 44, fourth 58; patella + tibia of first 19.5, of fourth 22; width of tibia of fourth 5, length 12.5; height of protarsus 4.2, length 14.

*Loc.*? Very likely S. America.

## Part II.—The Genera of the Section Aviculariæ.

The S.-American genera referable to Simon's Aviculariæ\* may be tabulated thus:—

- a. A stridulating-organ of clavate bristles differentiated from the oral fringe on the anterior side of the coxa of the palp; posterior side of coxa of palp at its distal end and of trochanter and base of femur scopulate; anterior side of coxa of first leg thickly hairy, of trochanter scopulate; two tibial spurs in male ..... *Psalmopæus*, Poc.
- b. No stridulator on anterior side of coxa of palp.
  - a<sup>1</sup>. Posterior side of trochanter and of coxa of palp at its distal end and anterior side of trochanter of first leg scopulate. Male unknown; eyes as in *Tapinauchenius* ..... *Ephebopus* †.

\* To this section may also be referred the West-African genera *Scodra*, Becker (= *Stromatopelma*, Karsch, and *Hyarachne*, Thor.), and *Heteroscodra*, Poc.

† Syn. *Santaremia*, F. Cambr. On a visit to the British Museum



- b*<sup>1</sup>. Posterior side of coxa of palp naked throughout the middle of its length; anterior side of trochanter of palp with ragged, not erect and stiff, hairs; anterior side of coxa of first leg thickly clothed with erect bristly hairs.
- a*<sup>2</sup>. Male with two tibial spurs; posterior sternal sigilla conspicuous, remote from the margin; anterior median eyes lying far in advance of the middle of the ocular area, owing to the weak procurvature of the anterior line .... *Tapinauchenius*.
- b*<sup>2</sup>. Male with one tibial spur on first leg; posterior sternal sigilla inconspicuous, sub-marginal.
- a*<sup>3</sup>. Eyes as in *Tapinauchenius*, no tibial spur on second leg in male ..... *Pachistopelma*.
- b*<sup>3</sup>. Eyes of anterior line strongly procurved, the medians lying in the middle of the ocular area.
- a*<sup>4</sup>. No tibial spur on second leg in male; fourth leg longer than first ..... *Avicularia*.
- b*<sup>4</sup>. A tibial spur on second leg in male; fourth leg shorter than first. .... *Iridopelma*.

#### Genus PACHISTOPELMA, nov.

Resembling *Avicularia* in the presence of a single spinous spur on the tibia of the first leg in the male, the marginal position of the sternal sigilla, absence of spines, development of scopulæ on legs, &c., but differing in having the eyes of the anterior line only a little procurved, the centres of the medians lying in front of the middle of the ocular area, the anterior edge of the medians being well in advance of the posterior edge of the laterals. As in *Avicularia* and *Tapinauchenius*, the posterior side of the coxa of the palp is naked throughout the middle of its length, the trochanter is clothed with long, soft, flexible hairs, and the anterior side of the coxa and trochanter of the first leg with simple slender hairs, intermixed just below the suture on the former segment with some delicate pin-like hairs.

Type *Pachistopelma rufonigrum*, sp. n.

#### *Pachistopelma rufonigrum*, sp. n.

♀.—Body and limbs clothed with short pale brown hairs; setæ on the limbs shorter than is usually the case and brownish; the femora, patellæ, and tibiæ indistinctly adorned with whitish bands, which are most conspicuous on the patellæ, protarsi ornamented with a median brown stripe

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some years ago Mons. Simon recognized the identity between the types of *Santaremia* and *Ephebopus*. The latter was referred by Simon to his section "Selenocosmiæ."



which proximally ends in a spot upon the posterior side of the segment. Abdomen covered with shortish rusty-red setæ. Inferior surface of trunk and coxæ black.

*Carapace* long, distinctly longer than broad, its width just exceeding patella and tibia of second leg, its length considerably exceeding patella and tibia of first, the distance between the fovea and the anterior border exceeding the length of the fourth protarsus. Ocular tubercle moderately high, wider than long; anterior row of eyes slightly procurved, the anterior edge of the laterals being only very slightly in front of that of the medians, which are considerably larger; space between the latter about equal to a diameter, and a little greater than between median and lateral. The two laterals on each side subequal in size, space between them less than their long diameter. *Legs* 1 and 4, 3, 2; femora and patella of first and fourth equal in length.

♂.—Considerably smaller than female, with longer legs and relatively wider carapace, the width just exceeding patella and tibia of third leg and considerably longer than protarsus of fourth, the length equal to patella and tibia of second leg; length from the fovea to the anterior border equal to the protarsus of the first.

Spur on tibia of first leg a simple, short, blunt, spinulose process. Palpal organ very much like that of *Avicularia avicularia*, but the proximal half of the filiform portion less strongly curved, the whole terminal portion when seen from above presenting a slight and very open sigmoid curvature. *Legs* 4 and 1, 2, 3; patella and tibia of fourth slightly longer than of first.

*Measurements in millimetres*.—♀. Total length 42, carapace 17, width of latter 14·8; length of first leg 49·5, of second 45·5, of third 42, of fourth 49·5; patella + tibia of first 15·5, of fourth 15·5.

♂. Total length 28·5, carapace 13, width of latter 11·8; length of first leg 45, of second 41·5, of third 38, of fourth 48; patella + tibia of first 14, of fourth 14·7.

*Loc.* Brazil; Iguarassu (*G. A. Ramage*).

Eight specimens of this species are in the British Museum collection, two adult males and six females, varying from 15 up to about 40 millim. In young specimens the abdomen has a sharply-defined, median, black line and four large yellow spots on each side.

#### Genus IRIDOPELMA, nov.

Differs from *Avicularia* in having a spur on the tibia of

the second leg similar to, but smaller than, that on the first leg. Moreover, the fourth leg is shorter than the first.

Type *Iridopelma hirsutum*, sp. n.

*Iridopelma hirsutum*, sp. n.

♀.—Carapace and limbs clothed with a short coating of greyish or yellowish-green hairs, the long setæ on the limbs also greyish green, no red hairs on the tarsi; the middle of the upper surface of the abdomen with a wide dark stripe extending from its base to the anus, with a band of long yellowish hairs on each side of it, with large ill-defined fuscous spots externally to the hairs; lower surface of abdomen, coxæ, and sternum black.

*Carapace* a little longer than wide, its width distinctly less than the patella and tibia of the second leg, which also just exceed its length, convex from side to side, the cephalic region scarcely at all elevated; ocular tubercle moderately high, oval, wider than long; anterior median eyes separated by a space which is greater than a diameter and greater than the space between them and the laterals, which they noticeably exceed in size; the two lateral eyes on each side about equal, space between them perhaps a little less than their long diameter. *Legs* 1, 4, 2, 3; patella and tibia of fourth less than of first, and only a shade greater than of second.

♂.—Much smaller than female. *Carapace* longer than wide, its width distinctly less than patella and tibia of third leg and than protarsus of first or fourth, just equal to tibia of fourth; length almost equal to protarsus of first, less than patella and tibia of third; length from fovea to anterior edge a little greater than patella of first, and exceeding half the length of the first protarsus. *Palpal organ* with the filiform piece curved through about one-third of a circle, the apex flexed slightly outwards.

*Legs* long and slender, 1, 4, 2, 3; patella and tibia of fourth equal to patella and tibia of second.

*Measurements in millimetres*.—♀. Total length 50, carapace 18, width of latter 17; length of first leg 65, of second 66, third 52, fourth 62.5; patella + tibia of first 20.5, of fourth 19.5.

♂. Total length 27, carapace 11; first leg 55, second 49, third 40.2, fourth 49; patella + tibia of first 16.3, of fourth 14.8.

*Loc.* Brazil (*D. Wilson-Barker*); Pernambuco (type) (*H. N. Ridley*); Iguarassu (*G. A. Ramage*).

It appears to me that *Mygale detrita* of C. Koch (*Die Arachn.* ix. p. 85) may belong to this genus. It is certainly,

however, I should say, specifically distinct from *hirsutum*, on account of the greater length of its posterior legs and difference of colour. Moreover, no mention is made in the diagnosis of the tibial process of the second leg.

Part III.—Genera dismembered from *Eurypelma*.

Genus CITHARACANTHUS, nov.

Resembling *Lyrosceles*, F. Cambr., in possessing a system of stout plumose stridulating-bristles upon the trochanter of the palp and first leg; but differing in the presence of a second organ upon the coxæ of these appendages, the organ consisting of a large number of short, stout, almost conical spines, terminating in a long, filiform, frequently fractured extremity, and rising in the midst of a thick cluster of simple hairs. These spines occur both above and below the suture on the coxa of the first leg, and near the upper margin of the posterior side of the coxa of the palp.

Type *Citharacanthus longipes*, F. Cambr. (sub *Eurypelma*).

*Citharacanthus longipes* (F. Cambr.).

*Eurypelma longipes*, F. Cambridge, Biol. Centr.-Amér., Araneidea, ii. p. 21, pl. i. figs. 15 a-e (1897).

The type of this species is an adult male taken at Chicoyito in Guatemala. An adult female from the same locality presents the same structural features. The specimen from Cubilquitz, doubtfully referred to this species, belongs to the genus *Brachypelma*.

Genus PTERINOPELMA, nov.

Resembling *Brachypelma* in having the posterior side of the trochanter of the palp and the anterior side of that of the first leg scopulate with finer or coarser delicately plumose hairs, but without scopula of similar hairs upon the anterior inner side of the femur of the first leg, and the inner side of the coxa of the first leg clothed with simple hairs with slender not spiniform bases. Protarsus of first leg closing outside the lower tibial spur.

Type *Pterinopelma vitiosum*, Keys. (sub *Eurypelma*).

*Distribution*. Southern part of North America (Monte Video, Uruguay, &c.).

Genus DUGESIELLA, nov.

A scopula of very delicately, almost invisibly, plumose

hairs upon the posterior side of the trochanter of the palp (a few also on the base of its femur), also upon the inner side of the femur of the first leg as in *Brachypelma*, but on the anterior side of the trochanter of the first leg the plumose scopula present in that genus is almost entirely replaced by basally stout and apically filiform spines; hairs on the anterior side of the coxa almost wholly converted into similar spines both above and below the suture. Also on the posterior side of the coxa of the palp there are similar spines intermixed with the hairs both above and below the naked area, while near the middle of the base of this area there is a small cluster of spines.

The spines on the coxæ suggest those of *Citharacanthus*, but in the latter they are considerably stouter and do not replace the normal clothing of slender hairs below the suture. Moreover, there is in *Citharacanthus* no scopula on the inner side of the femur of the first leg, and there are long delicately plumose spines rising amongst the scopular hairs on the trochanter of the palp, and large plumose spines on that of the first leg.

Type *Dugesiella crinita*, sp. n.

*Dugesiella crinita*, sp. n.

♂.—*Colour*: carapace, legs, and mandibles covered with olive-black hairs; abdomen more intensely black; legs above and below, sternum, and abdomen thickly hirsute with long foxy-red bristles.

*Carapace* nearly as wide as long, a little shorter than protarsus of fourth, and about as long as tibia and half the patella of this leg, as long as femur of fourth or of first and as patella + tibia of palp; cephalic area moderately high.

*Eyes* of anterior line subequal; medians rather more than a diameter apart, rather less from the laterals.

*Legs* 4, 1, 2, 3, fourth exceeding the first by about half its tarsus; protarsus of first and second scopulate to base, without basal spines on first, and with one basal spine on second; tibia of first not incrassate, with one external basal spine and two strong apical spines above the spur; upper spur cylindrical, obtuse, with a short straight spine below it; lower spur only lightly curved and armed with a short blunt spine; protarsus strongly arcuate. Tibiæ of second, third, and fourth legs with only a few inferior spines; inner side of femur of first and of fourth and posterior side of trochanter of palp subscopulate with simple hairs.

*Palp* long, reaching nearly to end of tibia of first leg, its



tibia armed with one internal spine; palpal organ serrate along the convex side of the base of the spine as in *Eurypelma serratum*, but the spine is much thinner than in that species, though otherwise similar.

♀.—Like the male in colour, but more hirsute.

*Carapace* as long as patella + tibia of first or fourth leg (protarsus of fourth scarcely exceeding cephalic area in length), and as protarsus and half the tarsus of the fourth, and scarcely shorter than tibia and protarsus of second or third. A second specimen, perhaps not quite adult, has relatively longer legs, the patella and tibia of first and fourth being considerably longer than the carapace, the cephalic area of which is also much shorter than the fourth protarsus.

*Measurements in millimetres*.—♂ (type). Total length 27; length of carapace 13, width 12; length of cephalic area 8.5, of first leg 47, second leg 45.5, third leg 42, fourth leg 51; patella + tibia of first and of fourth 16, protarsus of fourth 14.5.

♀. Total length 42; length of carapace 18, width 16 length of cephalic area 12, of first leg 46.5, second 44, third 41, fourth 52; patella + tibia of first and fourth 18, protarsus of fourth 13.

*Loc.* Mexico; Guanajuato (*A. Dugès*).

#### Genus *APHONOPELMA*, nov.

Anterior side of coxa of first leg thickly clothed with hairs, most of which have stout spiniform bases and slender filiform extremities; anterior side of trochanter with clothing of simple hairs, with at most one or two spiniform setæ; no plumose scopula on the inside of the femur and no plumose scopula on posterior side of trochanter of palp, merely simple hairs, and no spines or spiniform setæ on the posterior side of the coxa of the palp.

Type *Aphonopelma Seemanni*, F. Cambr. (sub *Eurypelma*).

*Distribution*. Southern States of North America and Mexico.

I also refer to this genus species from California and Texas as well as *Eurypelma rusticum*.

#### Genus *PLESIOPELMA*, nov.

Resembling *Homœomma* in that the base of the protarsus of the first leg in the male passes between the two tibial spurs, but differing in having the protarsi of first and second legs scopulate to base, of third more than half covered below, and of fourth with nearly half of it covered. Palpal bulb without



basal prominence, and with spine slender and apically pointed. Coxa of first leg clothed in front with simple slender bristles intermixed with erect pin-like hairs, of trochanter covered with slender ragged bristles; coxa of palp naked throughout its median length behind, the trochanter without scopula.

Type *Plesiopelma myodes*, sp. n.

*Plesiopelma myodes*, sp. n.

♂.—Prevailing colour black, hairy clothing olive-brown with silky-golden lustre, legs indistinctly banded longitudinally above.

*Carapace* low, longer than wide, as long as patella and tibia of second leg, a little shorter than those of fourth, considerably shorter than those of first, slightly longer than protarsus and tarsus of first, than protarsus and half the tarsus of the fourth, and than patella, tibia, and tarsus of the palp; length from fovea equal to tibia of fourth or of first.

*Eyes* of anterior line large, laterals larger than medians; medians considerably less than a diameter from each other and from the laterals.

*Legs* 4, 1, 2, 3, fourth a little more than three times as long as the carapace, not so thick as the first; tibia of first armed with two internal and about four inferior spines, its protarsus scopulate to base, but not spinous proximally; protarsus of second with about three strong spines at base of scopula; protarsus of third with more than its lower half, of fourth with its lower half scopulate. Upper tibial spur of first leg short, cylindrical, with long inferior spine, lower spur stout, not strongly arcuate, with short apical spine; protarsus not arched, with external basal nodule. Tibia of palp with one inner spine; palpal organ with spine stout at base, filiform at apex, with a slight spiral curvature and two strong keels. Basal segment of palp and first leg clothed with simple hairs.

*Measurements in millimetres.*—Total length 26; length of carapace 13, width 11; length from fovea 8; length of first leg 39, second 36, third 32, fourth 41; patella + tibia of first 15, of fourth 18.5; protarsus of fourth 9.5.

*Loc.* Uruguay.

Genus ACENTROPELMA, nov.

Resembling *Metriopelma*, but with the anterior side of the trochanter and femur of the first leg and the posterior side of the trochanter of the palp covered with a scopula of relatively stout delicately plumose bristles.

Type *Acentropelma spinulosum*, F. Cambr. (sub *Metriopelma*).

In *Metriopelma*, at least in the species that I refer to *Breyeri* and *tetricum*, there is no scopula, merely normal hairs on the surfaces above mentioned.

To the synonymy of *Metriopelma tetricum*, Sim., must be added *Miaschistopus rapidus*, Poc., based upon specimens in the British Museum from Keyserling's collection labelled W. Africa. The error of locality misled me into describing the specimens as the representatives of a new genus and species.

LXX.—*Description of Two new Species of Bracon from Bengal.* By Col. C. T. BINGHAM, F.Z.S., F.E.S.

My friend Mr. L. de Nicéville, Government Entomologist, Indian Museum, Calcutta, has kindly entrusted to me for identification two species of *Bracon* bred from the larvæ of *Scirpophaga auriflua*, Zeller, a moth belonging to the family Crambidae, extremely destructive to the sugar-cane plantations in Bengal. So far as a careful examination of the material in the collections of the British Museum and of the very scattered literature on the subject have enabled me to judge, both the species sent have not been previously described. I have ventured to name one after Mr. de Nicéville.

*Bracon Nicévilii*, sp. n.

♀. Fulvous yellow, the tips of the mandibles, the antennæ, a broad band across the vertex of the head, the fifth and base of the sixth abdominal segment above, and the sheath of the ovipositor black, the ovipositor itself yellow, the posterior tibiæ and tarsi fuscous: wings hyaline yellow, the apex of both and inferior margin of hind wing infuscated; the front wing with two fuscous clouds, one in front of the basal nervure, passing from the costal margin of the wing through the discoidal cells, the other covering the apical half of the stigma and passing through the second cubital cell; base of stigma yellow; a clear hyaline spot in the first cubital cell. Head and thorax smooth and shining; legs covered with a short pubescence; a triangular impressed mark on the face above the clypeus slightly raised in the middle, with a small pit at each angle connected by furrows; a deep, short, impressed line vertically from between the base of the antennæ to the pit at the apex of the triangle; the thorax

above and the pleuræ smooth and shining, the median segment broad, smooth, evenly rounded, the sides with an irregular, large, longitudinally impressed depression. Abdomen broad, the basal segment with well-marked lateral furrows diverging towards the apical margin of the segment, the middle near the apex bearing a short longitudinal carina; abdominal sutures distinct, that between the second and third segments crenulate, the second segment with a diamond-shaped raised plane in the middle at base, beyond which the depressed dorsal surface of the segment is coarsely rugose; the apical margin smooth and shining, the second, third, and fourth segments with short, lateral, oblique furrows, which are distinctly crenulate; the rest of the abdomen above smooth and shining.

♂. Closely resembles the female, but is longer, with a narrower abdomen; the antennæ brownish yellow; the apical joints of the intermediate and posterior tarsi fuscous; the dorsal surface of the sixth, not fifth, abdominal segment black, the second to fourth segments with oblique lateral depressions and transverse furrows arching towards the bases of the segment: wings narrower, the fuscous clouds on the fore wing smaller.

♀. Length 12 millim. to apex of abdomen; ovipositor 15 millim.; expanse 20 millim.

♂. Length 14 millim.; expanse 20 millim.

Allied to *B. agraensis*, Cameron, but differing in the colour of the wings and considerably in the sculpture of the thorax and abdomen.

*Bracon famulus*, sp. n.

♀. Resembles the preceding, but the head is broader, flattened above, and abruptly truncated at the occiput, the thorax larger proportionately, the median segment with a longitudinal medial groove, along the middle of which is a short raised carina; the abdominal segments coarsely rugulose above, the apical segment smooth and shining, the sutures between the second, third, fourth, and fifth segments indistinctly crenulate, the second and third segments with oblique lateral depressions. Fulvous yellow, the antennæ deep brownish black; a large circular black spot on either side of the third segment at apex; posterior tibiæ and tarsi fuscous, basal half of the sheath of the ovipositor black: wings hyaline yellow, fuscous on the apical half of both wings; fore wing with a fuscous cloud on either side of the basal nervure, succeeded by a clear hyaline spot in the first cubital, passing into the discoidal cell; the basal portion of the stigma yellow; a

hyaline spot in the marginal cell and a hyaline line on either side of the second transverse cubital nervure.

♂. Similar, more slender; the abdomen narrower; the antennæ, the space round the ocelli, and a spot on the lateral margins of the second to sixth abdominal segments black; the wings with the fuscous cloud around the basal nervure extending further towards the apex of the wing.

♀. Length 13 millim. to apex of abdomen; ovipositor 5 millim.; expanse 21 millim.

♂. Length 12 millim.; expanse 19 millim.

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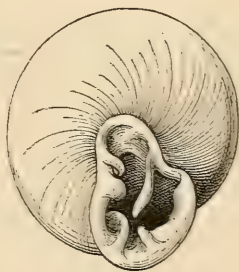
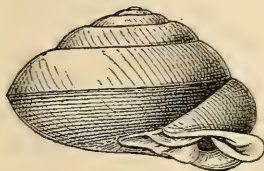
LXXI.—*Description of a new Species of Land-Shell from Colombia.* By S. I. DA COSTA.

*Labyrinthus colombiensis*, sp. n.

Testa imperforata, orbicularis, globoso-conoidea, solida, rufo-fusca, lineis obliquis, curvatis striata; spira depressa, ad apicem obtusa; anfractus  $5\frac{1}{2}$ , convexiusculi, ultimus ad peripheriam obtuse carinatus, antice descendens; apertura horizontalis, transverse auriformis; peristoma contractum, continuum, album, breviter reflexum, sinuosum; pone labrum biserobiculatum, marginibus callo alto prominente, laminam erectam intrantem emittente junctis, supero arcuato, basale flexuoso, intus tuberculis duobus, dente altero brevi, altero obtuso majore, dextro inæqualiter bidentato.

Alto 21; diam. maj. 34 mm., min. 30 mm.

*Hab.* Santa Marta, Colombia, South America.



This species differs in many respects from others of this group, which are almost invariably deeply umbilicate, flat, and sharply carinate. *L. Sieversi*, Marten, both in form and the armature of the aperture bears a strong resemblance to this



species (see 'Manual of Conchology,' vol. ix. pl. xxii. figs. 7 & 8), but it is less than a third of the size; both are from the same locality. In the new species it will be observed that of the two basal tubercles that one nearest the columella is remarkably strong and bends towards the left, the other, which is much smaller, in the opposite direction.

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LXXII.—*On Three Blind Victorian Freshwater Crustacea found in Surface-water.* By O. A. SAYCE.

DURING a collecting excursion in the district of Gippsland, Victoria, I found, amongst a number of normal inhabitants of a little freshwater runnel, three blind species of Crustacea. Two of these are Isopods, but members of different tribes, and the other one is an Amphipod.

The fact of these widely separated forms, each being blind, inhabiting surface-water in the same locality, with proof of their breeding there, is, I consider, of special zoological interest, pointing, as they apparently do, to a cave or subterranean origin; but when and how they have changed their habitat, and, reverting back, entered the struggle for existence with the surface-fauna, I am unable to decide.

I shall now enumerate the blind species and describe the place in which they were found and the leading geological features of the surrounding country so far as my limited knowledge will allow.

*Enumeration of the Species.*

No. 1. *Phreatoicoides gracilis*, Sayce (9).—This species was taken from running water, and in all some twenty individuals were collected, comprising males and females of different sizes, and one with eggs in the marsupium. They were found mostly within crevices of logs and amongst the matted fibres of dead tree-fern trunks lying in the water.

No. 2. *Janirella pusilla*, Sayce (11).—About a dozen males and females were collected from a bunch of dead moss in a small pool within a few yards of the streamlet formed through the uprootal of a large Eucalypt. Many of them had developing young in the marsupium.

No. 3. *Niphargus pulchellus*, Sayce (10).—Only three individuals were found, and each was taken from the same little pool as *Janirella pusilla*.



*Description of Locality.*

The locality is not far from the township of Thorpdale, in Gippsland, and the tiny streamlet previously mentioned, which eventually feeds the Narracan River, runs somewhat rapidly between the bases of two steep hills, but is interrupted in its course by logs and fallen tree-fern trunks and other forest débris, so that the water is often dammed back and turned aside, and sometimes it widens out and forms shallow areas, over which the water slowly flows. It is evidently fed by spring-water. The valley has a virgin growth of larger and smaller forest-trees and ferns, forming a dense undergrowth, which shuts out to a large extent the direct rays of the sun.

The locality is richly inhabited by ordinary forms of life, such as are found in similar situations elsewhere; amongst these may be mentioned two other species of Crustacea living in the water in association with the blind forms—one a crayfish (*Astacopsis* sp.) and the other an Amphipod (*Atyloides Gabrieli*, Sayce). Both of these were in considerable numbers and have been found in other localities.

It will thus be understood that the locality is not shut off and isolated by any barrier, but that the struggle for existence amongst the inhabitants is in as full force as elsewhere.

The district generally is of a hilly character and heavily timbered. The altitude of the place where the specimens were taken is between 800 and 900 feet above the sea-level, and distant about 30 miles from the sea-board. The geological formation of the district is, according to the government map, Mesozoic, which is overlaid at the locality mentioned by a small area of Volcanic. At some distance to the south and also northward there are Upper Tertiary deposits, and north of this, less than 20 miles distant, there is an extensive area of Upper Silurian, stretching for miles northward and also eastward and westward.

*Relation of the Species to known Forms.*

The nearest known allies of the several species were considered in the original papers describing them; I shall, however, briefly allude to them here, but first I shall enumerate the known members of the peculiarly Australasian Isopod family Phreatoicidæ, to which *Phreatoicoides* belongs.

*Phreatoicus typicus*, Chilton, and *P. assimilis*, Chilton, both blind inhabitants of subterranean waters in New Zealand.—These two, together with other New-Zealand subterranean

Crustacea, are described by Dr. Chilton in a very complete and valuable paper (1), to which I am greatly indebted, which contains not only descriptions and drawings of the species, but many questions are debated concerning the fauna of caves and wells, and also there is a carefully compiled bibliography upon the subject and notes thereon.

*Phreatoicus australis*, Chilton (2).—This species, which has normal eyes, is described as occurring under stones in a boggy flat near the summit (5700 feet) of Mount Kosciusko, which is within 200 miles of Thorpdale in a north-easterly direction. Mr. G. M. Thomson also records it from freshwater pools on the top (4100 feet) of Mount Wellington in Tasmania (6), and from the same island I have also received specimens of it from a mountain-lake situated at an elevation of 2900 feet, and compared them with co-types (14).

*Phreatoicus tasmanice*, Thomson (7).—This was collected from the Great Lake, Tasmania, which lies at an elevation of 3800 feet above sea-level; it also has normal eyes.

*Phreatoicus Shephardi*, Sayce (12).—This was taken from a tiny streamlet on the north side of the Dividing Range, near Whittlesea, Victoria, at an elevation of about 2000 feet. It is without the slightest appearance of any eyes.

*Phreatoicopsis terricola*, Spencer & Hall (8).—This species is of terrestrial habit, and is recorded as being obtained burrowing in earth on the hills in the dense forest near Colac, Victoria. It has normal eyes.

In the following characters those of the above species having the closest resemblance to *P. gracilis* will now be given. I have not, however, seen the New-Zealand forms, but judge them from the very careful descriptions and drawings of Dr. Chilton.

1. *Shape of body and comparative length of antennæ*.—*P. gracilis* is much more slender than any other species, due in part to the pleura not being produced. I omitted to mention in my original description that the males have considerably longer antennæ than the females; they are more than half the length of the body. In these respects it compares closely with the New-Zealand subterranean forms, and of these two most closely with *P. typicus*. The body of that species is longer than *P. assimilis* and the pleura only moderately developed, but both are more slender than any of the other surface-forms except *P. gracilis*.

2. *Want of colour*.—It is in agreement with the New-Zealand forms; all the rest have more or less of colour-markings.

3. *Want of eyes*.—Agrees with the New-Zealand forms and also with *P. Shephardi*.

4. *Mouth-parts*.—Of the New-Zealand forms, nearer to *P. assimilis* than to *P. typicus*, but nearer to *P. australis* and *P. Shephardi* than either, on account of their stouter mandibles.

*Janirella pusilla*.—This species agrees in general shape and leading features with Leach's genus *Janira*, also with Sars's genus *Ianiropsis*, which so far contains only one species, viz. *I. breviremis*, from the west coast of Norway. Sars says that there are no known freshwater Ianiroidæ (5); but from Stebbing I notice that *Jæra Guernei*, Dollfus, of the same family is an inland river species of the Azores, and also that *J. Nordmanni* (Rathke) and *J. albifrons*, Leach (two British species), are often at home in runnels of fresh water traversing sea-beaches (4. p. 379).

*Niphargus pulchellus*.—Mr. G. M. Thomson describes two species closely allied to the genus *Niphargus* from Tasmanian surface-freshwater (6). These species differ considerably from *N. pulchellus*, but of the two it is nearest to *N. montanus*, obtained from pools on the summit of Mount Wellington, where also *Phreatoicus australis* was taken. In contradistinction it has the antennæ and terminal uropoda very short, the body stouter, and it possesses eyes. My species appears to be nearer to some of the English forms, but I have no specimens for comparison.

### *Special Characteristics of the Species.*

The special characteristics of the three species are:—

1. *Loss of eyes*.—In each there is a total loss of the crystalline lens and pigment. In *Janirella pusilla* there is, however, on the dorsal surface of the cephalon of some, but not to be seen in all, a pair of small circular areas somewhat clearer of colour than the surrounding parts, which may be vestiges of eyes, but of which I have doubt. As mentioned in my paper (9), after examining serial sections through the head of *P. gracilis* I failed to detect any trace of optic lobes or nerves.

2. *Colour*.—In both *P. gracilis* and *N. pulchellus* the colour is quite white, without any trace of pigment; but a female, with eggs in the marsupium, had the eggs of a decided yellow colour. *J. pusilla* has a slight general ochreous colour, but without any definite markings or pattern.

3. *Compensation for loss of eyesight*.—For loss of eyes one would expect to find some specialization of other sense-organs or in some way a compensation. So far as touch is concerned this is apparent in the species under consideration, as is shown by the following table of measurements of the eminently tactile antennæ as compared with the nearest known allies possessing eyes; but in this relation it is important to bear in mind that these allies are not of close affinity except in the case of *P. gracilis*.

In the following table the length of the body of each species is taken as 100, and the antennæ in relative proportion:—

<i>Phreatoicoides gracilis</i> , ♂ ...	$\frac{67}{100}$	<i>Phreatoicus australis</i> , ♂ .....	$\frac{33}{100}$
" " ♀ ....	$\frac{49}{100}$		
<i>Niphargus pulchellus</i> .....	$\frac{68}{100}$	<i>Neoniphargus montanus</i> .....	$\frac{24}{100}$
<i>Janirella pusilla</i> , ♂ .....	$\frac{139}{100}$	<i>Janiroopsis breviremis</i> , ♂ .....	$\frac{95}{100}$

As to the question whether there are a greater number of setæ generally over the surface of the body and legs, and also of olfactory and auditory setæ, than in allied species with functioning eyes, I think it is not so in the species under consideration; it is, however, hard to judge, but at least I have not observed any notable increase of either simple or specialized sensory setæ.

The shape of the body of both *P. gracilis* and *N. pulchellus* is remarkably slender by comparison with other surface allies. This has been observed by Chilton in his two subterranean species of *Phreatoicus*. He says, "In the two species of *Phreatoicus*, *P. typicus* and *P. assimilis*, the body is more slender and the antennæ and legs longer, especially in *P. typicus*, than in the surface species *P. australis*" (1. p. 262). An explanation for which he offers: "It appears probable that, in the case of species living in underground waters, the greater slenderness of the body has been acquired in order to adapt the animal for its life in the restricted spaces between the stones and shingle in which it has to live."

#### *General Considerations.*

In the orders to which the three species under consideration belong the normal forms possess eyes; we must conclude therefore that atrophy has taken place in the ancestors of the blind species. Packard, who has given earnest consideration to and investigation of the cave-fauna of North America, publishes in an extensive paper a list of blind or eyeless



animals that are not inhabitants of caves (3). From a study of this list it may be seen how very exceptional is the absence of eyes in orders and classes of animals in which they are generally present, other than inhabitants of dark caverns, subterranean water, or ocean and lake abysses, but that there are exceptions must not be forgotten. In the order Amphipoda there are no blind forms recorded from lighted situations in the list just mentioned, and I am unaware of any other than the present instance of widely separable forms, each being blind, living and breeding in one place amongst normal surface-forms.

That they possess the peculiar characteristics of a subterranean or cave life—viz. loss of eyes and want of colour, to which may be added slenderness of form,—will, from the foregoing, be obvious; and when it is remembered that they belong to widely separated groups and are found in the same locality, one is justified in assuming that their near ancestors were inhabitants of subterranean waters or caves; but how long since such was their habitat and in what way the change has been accomplished I am unable to offer any opinion. It is at least clear that they have been and are still successful in the sharper struggle incident to a surface-life; and on account of this one would expect to find greater modification of sensory organs, to endow greater sensibility, than in the subterranean forms, where there are so few competitors. This, however, does not appear to be the case except in the *Niphargus*, in which the terminal pair of uropoda is characteristically increased in length. As previously stated, there does not appear to be any appreciable difference in the number of olfactory and auditory setæ. Regarding the other two species, it must be remembered that they are Isopods and that the members of this group are normally frequenters of secluded situations.

To say how long a time has elapsed since the blind Thorpdale species have inhabited total darkness such as would have led to entire atrophy of the eyes would be pure speculation, for there appears to be no data to reason from. Any subterranean waters that may exist in the locality must, on geological evidence, be quite local, for the extensive Silurian area mentioned as existing less than 20 miles northward would prevent the possibility of remote subterranean waters reaching this locality. Neither is there any evidence, nor indeed is there any probability, of any large cavernous recesses existing either at the surface or underground.

As a matter of interest, certainly not for comparative deduction, I may mention that Packard, for one, quotes several



facts (3. p. 139), which, he says, tend to show that the bleaching of the body and atrophy of the eyes, as well as the adaptation to a life in darkness, may have been induced after but a few generations, perhaps but one or two only, resulting in the comparatively rapid evolution of cave-species; but I am unaware of any facts to shed light upon the possible length of time that might ensue to regain organs that have suffered decadence.

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11. ——. "On a new Genus of Isopoda (*Janirella*)," *op. cit.* xiii. part 1.
12. ——. "On a new Species of *Phreatoicus*," *op. cit.* xiii. part 1.
13. ——. "On some new Victorian Freshwater Amphipoda," *op. cit.* xiii. part 2.
14. ——. "On *Phreatoicus australis* from Tasmania," Victorian Naturalist, xvii. no. 6.

### BIBLIOGRAPHICAL NOTICE.

*A Handbook of British Birds.* By J. E. HARTING, F.L.S., F.Z.S.  
New and Revised Edition. Pp. xxxi+520 and 35 Plates.  
London: John C. Nimmo, 1901.

THIS book should find a place in the library of every working ornithologist, for it contains much that is not to be found in any other work of the kind with which we are acquainted.

It is primarily intended as a source of quick reference as to the precise status of every species which has occurred in Great Britain and Ireland to the end of 1900. Although we notice some omissions, perhaps inevitable in a work of this kind, perfect reliance may be placed on the work as a whole. Mr. Harting has done much more

than give us a mere list of detailed occurrences of rare birds or bald commonplace statements of facts concerning residents, for field-notes of an extremely interesting character are copiously distributed throughout its pages.

Our avifauna, from various causes, is being slowly depleted, and no one, turning over the pages of the volume, can fail to realize that we owe Mr. Harting a great deal for having rescued from oblivion facts of the greatest interest concerning many species which have long since ceased to be more than occasional visitors to our shores, but which were at one time very common birds. Scarcely less valuable are the notes on the derivation of the names of birds, such as the Capercaillie, Solan Goose, Reeve, and Spoonbill, for instance; for they represent much laborious research in fields inaccessible to most of us.

The book is well bound and well printed, and furthermore is illustrated by 35 Plates giving coloured figures of the heads (and outlines, in many cases, of the feet) of most of our British birds. We cannot but feel that they could be very well dispensed with and so reduce the cost of the work; if they are to be retained more must be added, so that *all* the undoubted residents at least are included, and several more representing immature plumages must be added. Most of the figures are exceedingly good, some are exceedingly bad: none were drawn specially for the work, and all have appeared before in a Dutch work: finally, they were not drawn (save one or two) by Schlegel, as is stated on the titlepage, but by Keulemans. As to their arrangement, we venture to think it would have been better to place them all together at the end of the volume, instead of distributing them between every ten pages or so.

## MISCELLANEOUS.

### *Moore's 'Lepidoptera Indica.'*

*To the Editors of the 'Annals and Magazine of Natural History.'*

GENTLEMEN,—Enquiries having reached me for a continuation of my notes on this book ('Annals,' Dec. 1894), I beg to enclose you the information desired by my correspondents, as it is of general public service. As the parts are supplied direct by the publisher to the Museum, the dates of receipt here given may be regarded as within a few days of the actual date of publication.

		Received by the Brit. Mus. (N. H.).	
Pt.	XX. pp. 177-192.	14 Jan. 1895.	
	XXI. 193-208.	6 Apr. „	
	XXII. 209-232.	3 July, „	Not 18 Mar. 1895, as stated on p. 209!
	XXIII. 233-248.	20 Sept. „	Not 10 Apr. 1895, as stated on p. 233!

		Received by the Brit. Mus. (N. H.).	
Pt.	XXIV. pp. 249-274 [end of vol. ii.].	6 Mar. 1896.	<i>Not 8 May, 1895, as stated on p. 257!</i>
	XXV. 1-24.	11 July, "	
	XXVI. 25-48.	18 Nov. "	<i>Not 25 Mar. 1895, as stated on p. 1!</i>
	XXVII. 49-72.	5 Mar. 1897.	<i>Not 10 July, 1896, as stated on p. 41!</i>
	XXVIII. 73-96.	27 Aug. "	
	XXIX. 97-112.	26 Nov. "	
	XXX. 113-128.	25 Feb. 1898.	
	XXXI. 129-144.	1 June, "	<i>Not 3 Sept. 1896, as stated on p. 121!</i>
	XXXII. 145-168.	27 Aug. "	<i>Not 19 Mar. 1898, as stated on p. 137!</i>
	XXXIII. 169-192.	12 Oct. "	<i>Not 23 Apr. 1898, as stated on p. 145!</i>
	XXXIV. 193-216.	28 Nov. "	<i>Not 18 May, 1898, as stated on p. 177!</i>
	XXXV. 217-232.	17 Jan. 1899.	<i>Not 30 July, 1898, as stated on p. 209!</i>
	XXXVI. 233-254 [end of vol. iii.].	27 Jan. "	
	XXXVII. 1-16.	28 Mar. "	<i>Not 2 Jan. 1899, as stated on p. 1!</i>
	XXXVIII. 17-32.	4 May, "	
	XXXIX. 33-64.	19 Aug. "	<i>Not 31 Jan. 1899 and 1 July, 1899, as stated on pp. 33 and 41!</i>
	XL. 65-88.	15 Sept. "	
	XLI. 89-112.	18 Oct. "	
	XLII. 113-136.	5 Mar. 1900.	<i>Not 12 Sept. 1899, as stated on p. 121!</i>
	XLIII. 137-160.	22 Mar. "	
	XLIV. 161-176.	9 June, "	<i>Not 23 Sept. 1899, as stated on p. 169!</i>
	XLV. 177-192.	25 June, "	<i>Not 10 Apr. 1900, as stated on p. 177!</i>
	XLVI. 193-208.	18 Aug. "	
	XLVII. 209-224.	11 Sept. "	
	XLVIII. 225-260 [end of vol. iv.].	7 Nov. "	<i>Not 13 Aug. 1900, as stated on p. 249!</i>
	XLIX. 1-24.	2 Mar. 1901.	<i>Not 1 Jan. 1901, as stated on p. 1!</i>
	L. 25-48.	24 Apr. "	<i>Not 7 Feb. 1901, as stated on p. 33!</i>

C. DAVIES SHERBORN  
( 'Index Animalium' ).

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